

James P Smith

**Nursing Science
in Nursing
Practice**

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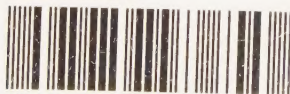
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Nursing science in nursing practice



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Butterworths

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First Published 1981

© Butterworths & Co (Publishers) Ltd., 1981

British Library Cataloguing in Publication Data

Nursing science in nursing practice.

1. Nursing

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610.73 RT41

ISBN 0-407-00202-2

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Introduction: the science and art of nursing

JAMES P. SMITH

The science of nursing is an emergent and new product (Rogers, 1970). 'The inevitability of its development is written in nursing's long commitment to human health and welfare.' Rogers further points out that, with today's rapid and unprecedented changes, a new urgency has been added to the critical need for a body of scientific knowledge specific to nursing: 'Only as the science of nursing takes on form and substance can the art of nursing achieve new dimensions of artistry.'

Aims

A number of explicit aims were accepted by all contributors. These were:

1. To illustrate that nursing science is a unique mix of biological, behavioural, social and other sciences.
2. To apply these sciences to the art of nursing, emphasizing the dynamics of the *practice* of nursing and the role of the nurse.
3. To provide a book containing chapters prepared by nurse experts, who are qualified by academic discipline and/or experience, in which the concepts, theories, 'models', and perspectives of the various sciences/disciplines are discussed and *applied* to nursing and the nursing process. It is anticipated that undergraduate nursing students and students who have completed their basic nursing training, including those taking the Health Visiting Certificate, the District Nursing Certificate and the Diploma in Nursing, will find the contents of the book of particular interest. However, it is hoped that it will become a valued reference source for *all* nursing students, and all qualified nurses, midwives and health visitors working in nursing practice areas, education, management, and research.

Not a tablet of stone

This textbook, produced by a team of British and American nurses, should not be accepted as a 'tablet of stone'. The contents are certainly not to be accepted passively, but critically, and they should be constantly questioned and challenged. That is the true spirit and tradition of science.

The contributors will not be at all surprised if their texts raise questions and are not necessarily acceptable to all readers. Neither will they be disappointed, provided that this encourages the reader to seek out the answers in a philosophical and scientific spirit of enquiry, for criticism without action is boring and intellectually barren.

The book initially focuses on the purpose of education in nursing. From that chapter we hope that the reader will see the perspective of the whole text, as expounded in subsequent chapters. For while no apology should ever be made for attempting to educate anyone, those attempting to educate nurses about nursing science, defined by Hockey (1973) as a 'unique mix of other sciences with the uniqueness lying in the mix', should always remember that nursing is a practice discipline. The art of nursing practice involves a unique blend of the contributions of the nurse's head, heart and hands.

Hockey (1973) has further pointed out that '... nursing is the art of applying nursing science.' Therefore, the chapters on research, philosophy, education and management, for example, are not written primarily for researchers, philosophers, educators and managers. They are written for all nurses who practise nursing in a variety of institutional and non-institutional settings.

The model of nursing accepted by all the authors is that of the nursing process which Mr Ian Hargreaves outlines early in the book, (*see* Chapter 3), thus providing the framework to which the other contributors constantly relate. As Yura and Walsh (1978) have pointed out, the goal of the science of nursing is understanding, whereas the goal of the art of nursing is skill. Both the science and the art, they stress, are '... integral parts of the nursing process ... Science suggests knowledge or intellectualization; art suggests action.'

The lesson of science

'Science finds order and meaning in our existence,' Bronowski (1964) reminds us. 'It is not a set of findings but a search for them ...' 'Human search and research is a learning by steps of which none is final and the mistakes of one generation are rungs in the

ladder, no less than their correction by the next . . .’ Dr Rosemary Crow’s chapter on nursing research (Chapter 4) succinctly and lucidly emphasizes that view. But that view is implicit in all the other chapters as well.

What science has to teach us, Bronowski so rightly points out, is not its techniques but its spirit: ‘. . . the irresistible need to explore.’ The lesson of science, he adds, is that the concept is more profound than its laws and the act of judging more critical than the judgement. That message pervades this book.

Development of professional nursing

There is no better way to understand the present state of nursing than through the past. A grasp of the historical development of any profession and discipline fosters a greater awareness of, and insight into, the functions and roles of its practitioners, and its status socially, professionally, economically and politically. It also enables one to put present dilemmas, problems, successes and aspirations into perspective.

Until recently the art of nursing was justified entirely in terms of compassion, humanity, ideals of service, and so on. Those aspects will always be essential in professional nursing care delivery. Nevertheless, if nursing care and the functions of nurses are to be rational, if nursing care programmes are to meet real needs, and if the effectiveness of these programmes is to be evaluated, then the art of nursing must rest on a scientific basis. However, as Mr McGilloway states in Chapter 5, it is very difficult and, indeed, artificial to review and assess the development of the science of nursing without also considering other factors which affect health care—such as social policies, politics, economics, the division of labour and distribution of resources.

These points are developed further by other contributors, not least by Miss Muriel Skeet (*see* Chapter 6) in her discussion of the impact of social policies on health care and nursing. She deals with the significance of social policies, from both British and international viewpoints, and provides the reader with a comprehensive overview of the dynamic interplay between social policies, professionalization, voluntary organizations and pressure groups. Nurses have much potential political muscle if only they will develop political consciousness and act on it, as she so rightly argues.

Later, the relationship of economics with nursing is eruditely developed by Dr Lisbeth Hockey, complemented by Mrs Caroline Cox’s sociological perspective (*see* Chapters 14 and 15).

Philosophical perspective

As Bronowski (1964) has argued, science has also created the values of our intellectual life. 'The values by which we are to survive', he stresses, 'are not rules for just and unjust conduct, but are those deeper illuminations in whose light justice and injustice, good and evil, means and ends are seen in fearful sharpness of outline.' It is therefore essential that a textbook on nursing science should also include a discussion on philosophy and ethics. Miss Ruth Schröck's chapter (Chapter 11) will certainly prove to be stimulating and helpful in that respect. It provides the reader with a rich philosophical perspective which is neither prescriptive nor proscriptive, as one expects of a true philosopher.

The study of philosophy in nursing has been sadly neglected in the past. There can be no doubt that Miss Schröck's excellent exposition of her discipline will help nurses in their search for truth to enhance nursing practice.

Nature of nursing

Much needs to be known about the nature of nursing before the peculiar nature of nursing problems can be grasped. I therefore make no apology for again repeating the definition given to nursing by Hockey (1973), and on which this book has been based: '... Nursing is the art of applying nursing science, nursing science being a unique mix of other sciences with the uniqueness lying in the mix.' Professor Jean Hayter's contribution on nutritional science applied to nursing (see Chapter 10) is an excellent illustration of the 'mix' in action.

The 'mix' of sciences contributing to nursing science will, of course, vary according to the nursing care setting, although most of the sciences will make some contribution to every setting. Ascertaining the appropriate mix should be a challenge to some aspiring nurse researcher. For example, the health visitor's, psychiatric nurse's and occupational health nurse's work will probably entail a heavier weighting of the social and behavioural sciences in the 'mix' appropriate to their roles, whereas the work of the nurse in an acute hospital setting will probably entail a heavier weighting of the biological, physical and chemical sciences in the mix. This can be illustrated very tentatively and speculatively, perhaps even as suggestions for hypotheses, thus:

If *nursing science* = biological sciences (B) + behavioural sciences (BB) + social sciences (S) + other sciences (O) (*Figure 1.1*), then in a health visiting setting e.g. a health visitor making a first home visit to



Figure 1.1 Model of nursing science

a recently born infant and his parents, the situation could be illustrated as in Figure 1.2:

$$\text{'Health visiting' nursing science} = f(B + BB_1 + S_1 + O)$$

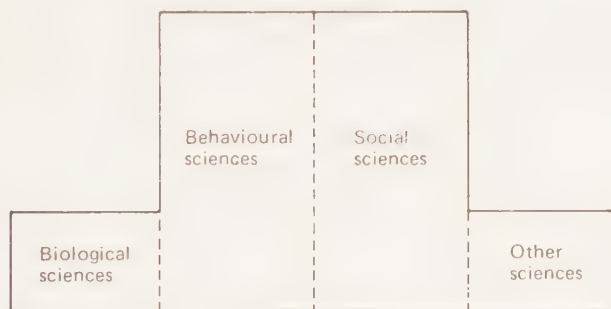


Figure 1.2 Model of 'health visiting' nursing science

whereas an acute nursing setting for example when a young man has an abdominal wound dressed by a nurse in the hospital ward, could be illustrated as in Figure 1.3.

$$\text{'Acute' nursing science} = f(B_1 + BB_2 + S + O)$$

(The weightings are tentative also and their appropriateness would need to be established by research.)

In summary, the mix of sciences chosen to develop the concept of nursing science in this publication is a mix of biological, behavioural, social, nutritional, physical and chemical sciences. Each of the chapters is written by experienced nurses qualified to write about and discuss the various scientific disciplines. The focus is primarily on application to the practice of nursing and roles of nurses—internationally.

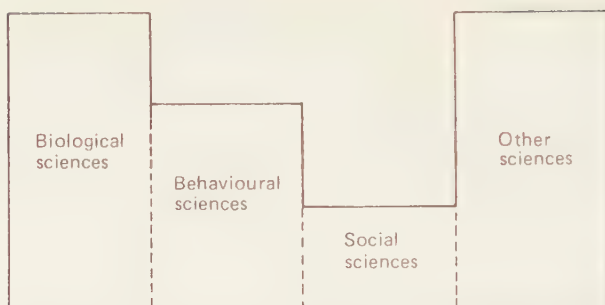


Figure 1.3 Model of 'acute' nursing science

Concepts and models

When reading the individual chapters, it will be obvious that these make individual contributions in their own right to the body of nursing knowledge. Where overlap of material has been retained in contributions by different authors it has been done to emphasize their different perspectives. This also illustrates that because nursing science is dynamic there can be no rigid boundaries. No discipline or science can claim sole right to any knowledge. As far as nursing science is concerned, the whole is certainly greater than the sum of the parts. The sciences making up nursing are as interdependent as are the health care professionals making up a health care team.

In a science, according to the view of the Nursing Development Conference Group (1973), a concept serves as a guide to the collection of relevant or important data. And, they argue, that as nursing phenomena tend to confound us by the great variety of characteristics, qualities, behaviours and interactions '... it is essential that adequate concepts which may form the substantive structure of nursing as a scientific discipline and which may guide enquiry be discovered, invented and articulated adequately.' Therefore the formulation of concepts in nursing—such as the concept of nursing science—should help nurses organize their knowledge about nursing so that they ask pertinent questions which are relevant to research into nursing care activities, as well as helping them in their planning and evaluation of nursing care programmes.

Dangers of reification

Please constantly bear in mind that a concept is only a general notion, formed in one's mind, that helps to illustrate and explain reality. It is not a thing in its own right. Thus, a concept of nursing is

only a 'model'. It is important to recognize this, in order to avoid the dangers of reification.

This idea is illustrated beautifully by Bronowski (1964) in his discussion of the concepts of gravitation and mass. 'There is of course no such thing as gravitation sensible to touch. It is neither seen nor heard . . . like "mass", it is a creation; symbols which do not exist without creation by man. Solid as it seems, there is no such thing as mass . . .'

A concept of nursing should be formulated primarily as a means of enhancing nursing care delivery. The formulation and implementation of nursing concepts can be a most fertile activity, provided that the activity always remains a means towards an end. If it is ever allowed to become an end in itself then, to my mind, it becomes sterile activity.

The procedures of a discipline can be mastered only by an exploration of its established content under the guidance of one who has already been initiated (Peters, 1964). Often, he says, critical thinking is nothing more than a substitute for not being well informed about anything. Content without criticism is blind, criticism without content is empty. Readers of this book will certainly be well informed, and their critical faculties will be nurtured and developed as well, under the fascinating exploration of specialist subject matter, by those (the contributors) who already have been initiated.

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The purpose of education in nursing

JAMES P. SMITH

Current nursing education should be preparing future practitioners to meet real health needs. Clearly, the future demands of patients cannot be predicted with precision, but there are sufficient facts, pointers and reasonable predictions which give us a valid starting point (Hockey, 1977). For example, there are certain trends which can be expected to have a bearing on nursing, and therefore on nursing education.

Predictions based on recent demographic trends indicate a continuing tendency to long life and reductions in the birth rate. There are, of course, economic implications in this trend as well as practical implications, as it will result in a smaller number of active people to provide support for a larger number of dependents. Recent and major advances in medical science and technology also suggest an increased survival rate of the unfit and of the physically and mentally handicapped.

In addition, increasing affluence and the spread of egalitarianism in all Western societies present new kinds of health problems with which nurses have to come to terms. Further increases in psychiatric illnesses may result from the additional pressures and complexities of life in the twentieth century. Also there are rapidly growing incidences of the so-called 'social' diseases caused by cigarette smoking, atmospheric pollution, alcoholism, excessive food intake, road accidents and so on, all of which could be prevented. The power to motivate prevention is probably a more important attribute of the modern nurse than the ability to promote cure. If this power is not being nurtured in nursing education programmes, then something very important is lacking.

The Director General of the World Health Organization has recently pointed out that '... nursing, like medicine, has for far too many years been predominantly orientated to meeting the needs of the privileged few. It is too late at this point to argue why and how this situation came about. What is more important is the need for all health workers, especially the professionals, to recognize and confront today's reality: the urgent health problems of the majority

of the people relate to poverty, to infection, to malnutrition, and under nutrition, to the lack of portable water, and to multiple environmental hazards. History has shown that such basic threats to health as these are unlikely to be countered by conventional health service techniques, however sensitively and intensively they may be applied by whatever category of health care' (Mahler, 1978). Those profound words imply that nursing education should be a means towards an end. Training should be for reality.

What is education?

For a while I want to examine 'education' itself, for, as Peters (1964) has argued '... too little attention is being paid to what it is that so many are deemed to be without.' He goes on to say that education has become rather like the Kingdom of Heaven—it is both within us and among us, yet it also lies ahead. The elect possess it, and hope to embrace those who are not yet saved. But what it is, he points out, is seldom made clear.

Education relates to processes in which a desirable state of mind develops. It would be as much of a logical contradiction to say that a person has been educated and yet that change was in no way desirable, as it would be to say that he had been reformed and yet had made no change for the better.

Asking questions about the aims of education is therefore a way of getting people to determine, and also a way of getting them to focus their attention on, what is worth achieving. For to call something educational is, as Peters argues, '... to intimate that the processes and activities themselves contribute to or involve something that is worthwhile.' It is one thing to understand the canons of any discipline or mode of conduct, but in Peters' view, it is quite another thing to apply them with skill and judgement in particular circumstances. Judgement, he claims, is the final flower of much experience. Nevertheless, he adds, '... such experience has to be acquired in the company of a man who already has judgement: it cannot be learned from books or formal lectures alone.' Nurse teachers should take particular note of that comment, for they will be appropriate role models for nursing students only if they are also nursing practitioners, sharing real-life nursing care activities with their students.

Nursing students have a particular inability to transfer classroom learning to clinical nursing practice (Wong, 1979). 'Difficulties on problems related to transfer of classroom information to the clinical practice are commonly encountered by many nursing students ...'

she says, and it seems to be one of the basic causes of academic failure and dissatisfaction with the school.

Peters argues that education implies standards, not necessarily aims. Education consists of initiating others into activities, modes of conduct and thought which have standards written into them, by reference to which it is possible to act, think, and feel with varying degrees of skill, relevance and taste. I agree with Peters' view that, if teachers are not convinced of this, then they should be otherwise employed.

Nursing education

The International Council of Nurses has defined a nurse as a person who has completed a programme of basic nursing education and is qualified and authorized in her/his country to provide responsible and competent professional service for the promotion of health, the prevention of illness, the care of the sick, and their rehabilitation. It is noteworthy, however, that the first priorities of the definition are for *promotion of health* and *prevention of sickness*. In spite of this guidance, most nursing education programmes in the Western World have traditionally been primarily orientated to the care of the sick, in fact, more to the care of the sickness rather than that of the sick person—a perspective that has dominated nursing since Florence Nightingale's reforms. Since these reforms, nursing activities have become tied to, and overpowered by, a medical model of care in which the patient is seen as a repository of disease, the emphasis on the nurse's role being primarily that of the alleviator of the symptoms of the disease.

In a fascinating examination of the continuity in the development of hospital nursing in Britain, Davies (1977) shows how Florence Nightingale fashioned professional nursing in Britain in a mould that persists: '... it involved acceptance of doctors as superiors, especially on the hospital ward, in routinization of ward work and a very broad interpretation of nursing work. It also involved the subordination of training requirements to service ones, aided by a training which itself stressed humility and discipline.'

After Florence Nightingale's reforms, nursing education developed and fostered the medical model approach, which became associated with a series of stereotyped, ritualized activities within a hierarchial profession (Chapman, 1974). Nursing was taught in classroom modules of, for example, medical, surgical or paediatric nursing, coupled with appropriate practical experience. These artificial divisions produce much unnecessary duplication or

triplication. For example, aseptic techniques may be taught in medical, surgical and paediatric nursing experience, while valuable information may be ignored because it does not 'fit' these pseudocategories of nursing. The role of 'significant others', such as relatives, friends, teachers and community leaders, in the care of sick people and in health promotion has often been totally ignored.

In the past the greatest dilemma associated with nursing curricula is that nursing has been regarded as subservient to medical treatment, and this has fostered and perpetuated the image of the nurse being a doctor's handmaiden and assistant (Davies, 1977) and Chapman (1974) has stressed that this has unfortunately militated against the professionalization of nursing itself. But, although the struggle for professional autonomy and independence as practitioners is right and proper for nurses, such movements could militate against effective team care if all health-care team members fail to recognize their *interdependence*.

A nursing ideology

The medical model centres on a diagnosis, based upon symptoms and investigation (Kennedy, 1981); progress is made towards a cure and, where a cure is not possible, the focus is on remission of symptoms and the alleviation of distress. Unfortunately this emphasis on pathology persists in '... most educational programmes' (Hall, 1980).

The nursing model, however, begins with assessment (Tiffany, 1979). First, an assessment is made of the deficiency of self-care brought about by the disease, of its treatment, and of the patient's reaction to both. The nurse does not consider disease as an isolated physical entity, and therefore considers the important psychosocial factors as well, for disease manifests itself within a social context, which is the total environment of the patient. That is a model in which nurses must be trained to function. For, as Henderson (1966) has so wisely reminded nurses: '... basic needs that the nurse attempts to meet, exist regardless of a diagnosis: however, they are modified by it ... nursing has its roots in fundamental human needs.'

If nurses accept this as the basic ideology and model of nursing, it follows then that nurses should be taught to identify patients' needs, and they should be assisted in developing appropriate clinical, practical and psychosocial skills which will enable them to meet their patients' needs.

This kind of approach emphasizes the individuality of nursing care programmes in which nurses recognize that patients' needs are

individual and different (irrespective of diagnostic labels). Meeting these individual and different needs requires an individualized nursing care programme, which will be different for each patient even though they may share the same diagnostic label. Hall (1980) has further argued that the need for nurses to assess needs for nursing care, to plan, provide and evaluate that care as an integrated whole '... is basic to the development of the discipline' of nursing. In order to achieve this and other important reforms, she urged that nurses '... need to stop searching for ever-elusive definitions and identities, and recognize themselves for what they are and what they should be.'

Furthermore, nursing education '... must be such that the nurse is able to recognize the patient's needs and make decisions regarding their order of importance ... she must be equipped with the appropriate knowledge and skills to meet these needs ... to ensure that these are not merely activities followed by tradition, she must be able to assess their effectiveness' (Chapman, 1974).

Teachers of nursing

A report prepared by Allen (1977) for the World Health Organization pointed out that teachers of nursing have traditionally devoted their efforts to teaching the knowledge and skills that are merely a prerequisite to nursing, even though the teachers have considered that this represents teaching nursing. However, training a nurse to respond to artificial situations of this nature is in conflict with the problem-solving approach which Allen advocates.

The critical function of the teacher of nursing '... is the ability to provide the conditions whereby the students can interact in a problem-solving way with the patient's situation. The teacher must practise nursing in this way and be aware of the potential of the problem-solving approach in the practice of nursing and in the process of learning to nurse' (Allen, 1977).

Examples abound of viable programmes that fail to prepare nurses adequately to meet the health needs of the community or country in which they work, Allen contends—a sobering thought. Those responsible for the development of nursing curricula therefore have a very responsible and difficult job. Allen and Murrell (1978), in sharing experiences of curriculum development at the Nightingale School, London, concede this. They point out that curriculum planning in nursing education is a dynamic rather than a static process because 'total health' is an unattainable goal. It is also especially difficult because the exercise of curriculum-planning in

nursing education is also anxiety provoking. Nevertheless, while accepting that such a state of affairs calls for care, they believe that it is not only acceptable but necessary, because studies of attitude-change suggest that attempts to produce change by concentrating on the cognitive components (simply giving new facts and ideas) are not as effective as techniques which concentrate on an 'affective' or emotional experience.

If it is felt that an important part of the curriculum planning is to change attitudes, then perhaps we have to accept the stress it may produce. 'We should be under no illusion' about the nature of this emotional minefield 'before we attempt to chart a route . . . through it' (Allen and Murrell, 1978).

The newly qualified nurse

Whatever kind of education nursing students have, by the time they qualify everyone must be convinced that they have acquired at least a minimum amount of information and knowledge and that they have reached minimal standards of safe practice (Altschul, 1977). It is more important that nursing students will benefit, not from the content of their nursing education programme, but from the process of study which, among other things, Altschul hopes will develop the skill of critical thinking.

Even though I have supported the suggestions that nursing education programmes should foster problem-solving and critical thinking abilities, I should add a word of caution, reiterating the views of Peters (1964). He points out that there have been many who have attacked the notion that education consists of the transmission of a body of knowledge by placing stress instead on critical thinking, individual experimentation, and problem-solving. But he adds that it is absurd to foster an abstract skill called 'critical thinking' without handing on anything concrete to be critical about: ' . . . there are as many branches of 'critical thinking' as there are disciplines and in the various disciplines such as history, science and philosophy there is a great deal to be known before the peculiar nature of the problem is grasped.'

I would also argue that there is much to learn about the nature of nursing before the peculiar nature of nursing problems can be grasped, and in this respect I am thinking once again about the definition of nursing given by Hockey in 1973, and cited in Chapter 1 of this book. Considerable knowledge of people and nursing science is also essential to help nurses to define nursing problems. To do this adequately the nurse must also become skilled in communications.

Quite obviously, nursing education should be preparing nursing students to be safe practitioners, and to meet the real needs of real people in the real world. This book aims to give nurses some of the tools with which to do their jobs well.

However, although I would expect a person who has received a professional education in a nursing education programme to be a different and better person at the end of the course, I would also expect him to be able to contribute to the health of the nation by caring for the sick, preventing illness, and promoting health. Nursing education is therefore, in my view, both an end and a means. It provides a rich educational experience for nursing students, which enables them to make an invaluable contribution to society as practitioners in the unique profession of nursing.

There is nothing contradictory in a profession claiming to be both practical and scientific. Bronowski (1964) reassures us: '... whether our work is art or science or the daily work of society, it is only the form in which we explore our experience which is different; the need to explore remains the same' As Peters (1964) puts it: 'To be educated is not to have arrived at a destination; it is to travel with a different view.' If the contents of this book do nothing more than convince nurses of that, then the practice of professional nursing will surely be enhanced.

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The nursing process

IAN HARGREAVES

Introduction

The concept of the nursing process is, like all concepts, a model. The concept of the nursing process is therefore a model of the process of nursing.

It is not the only model that has been, or could be, used. The medical model of care is well known. There is of course the self-care model and the model based on activities of daily living for which the term *nursology* has been coined by Roper (1976). Nevertheless, because the model of nursing care based on the nursing process is now commonly used by nurses in the United Kingdom and many other countries, that is the perspective used by the contributors to this book.

If you are cynical about the use of a concept of nursing at all, there is some evidence, documented by the Nursing Development Conference Group (1973) '... that the consistent use of a general concept of what nursing is has facilitated the instructional process and has resulted in students providing the type of care that results in patients requesting these students when crises are imminent.'

Although a variety of origins are claimed, the most telling claim is the one voiced by Henderson (1978), who holds that the term 'nursing process' was coined by Orlando (1961) in a discussion about psychiatric nursing. It was Orlando's view that '... the purpose of nursing is to apply the help a patient requires in order for his needs to be met. The nurse achieves her purpose by initiating a process which ascertains the patient's immediate need and helps to meet the need directly or indirectly ...'.

Two well-known proponents of the nursing process, Yura and Walsh (1978), argue that it is central to all nursing actions, applicable in any setting, and within any frame of reference. Although they have conceded that the exact labels identifying the phases of the nursing process may differ among groups of nurses, and from one geographic area to another, they assert that the common theme underlying the nursing process is that '... it is

organized, systematic and deliberate.'

After an extensive literature review, Hockey (1978) has pointed out that in looking for an appropriate conceptual framework in which to examine the process of nursing '... one is immediately aware of the fact that concepts are not immune from the vagaries of subjectivity.' Concepts, such as the nursing process, are '... inevitably influenced and determined by the frame of reference of the originator as well as the user of the concept ...'. And, in defence of this position, '... the concept of health itself is bound to be a reflection of societal, legal and individual values.'

As a process is a series of actions or events, it follows that the nursing process is a series of actions or events related to the work of nurses in any setting. These actions are commonly expressed as assessing, planning, implementing and evaluating nursing care. Information gleaned from the biological, social and other sciences will be useful in any or all of these stages, according to the individual nursing care setting, as indicated in the introductory chapter of this book.

Assessment

This is the first stage in the process and is intended to collect that information about the patient which will enable the nurse to identify the patient's problem. Such information is usually collected in the form of a nursing history. The type of information collected will depend on the nurse's or organization's view of what constitutes nursing and on their assumptions about the people for whom they are caring.

Information is obtained from the patient, his relatives and others who are involved in the care of the patient. The nurse interviews the patient with the specific purpose of gathering the information which is considered to be important. However, interviewing alone will not yield all the information required to identify the patient's problems. Much information is collected by observation, where the nurse uses her senses and measurement techniques to gain information additional to that supplied by the patient or his relative.

Assessment is a selective, discriminatory process requiring some judgement of relevance; in other words there must be a framework within which the assessment takes place (Altschul, 1977). It involves gathering information which enables the nurse to recognize physical, social or environmental problems experienced by the patient. This information is gained by assessing the patient's biological, emotional and social needs; the physical and social environment in

which the patient lives; and, his interaction with this environment. The result is a mass of objective and subjective data concerning the patient.

Identifying problems

Obviously, this information in itself will not result in effective nursing care. It has to be analysed, classified, and finally interpreted so that problems can be identified.

These problems may be present initially, at the time of the assessment, or they may be potential problems. A potential problem is one which an analysis of the information collected indicates that the patient is at high risk of developing, if preventive measures are not taken. These problems, identified on the basis of scientific principles and knowledge, indicate the patient's need for nursing care.

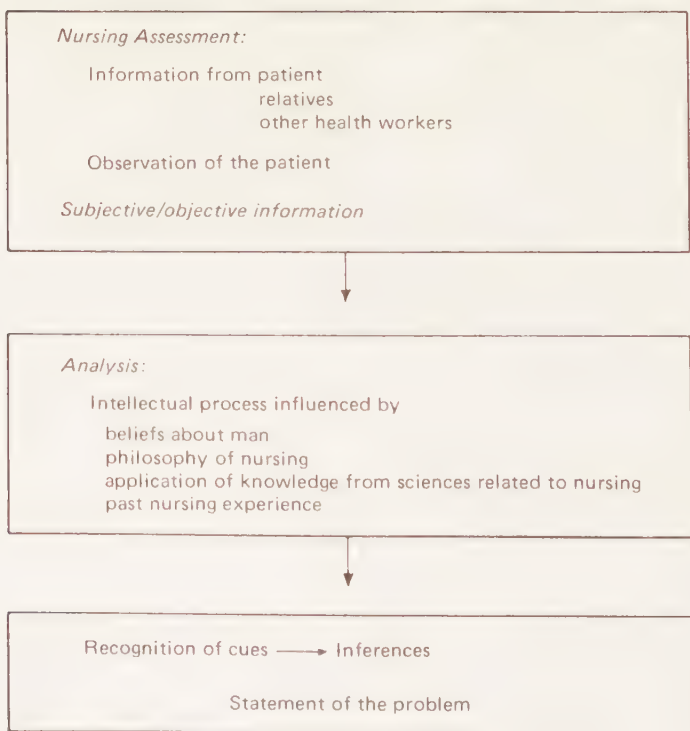


Figure 3.1 The process of assessment

Planning

This begins when the information collected has been analyzed and the problems identified. It can be simply described as 'deciding in advance what to do, how to do it, when to do it, and who is to do it'. Planning is an intellectual activity that requires the conscious determination of alternative courses of action and the taking of decisions, based on sound knowledge of what the outcome of a course of action is likely to be in relation to the individual patient's circumstances. Planning also entails the setting of objectives which, when achieved, will result in the solving or alleviation of the identified problems.

The purpose of the plan is to facilitate the accomplishment of the objectives by focusing the action to be taken on the desired outcome. It must also be possible, by some means, to measure or observe the degree to which the objective has been met.

Planning nursing care also involves determining which of the problems identified in the assessment stage demands priority of attention. Those problems which pose a threat to the survival or safety of the patient will obviously demand priority. If these problems are identified at the time of the initial assessment they should be dealt with immediately before a full assessment of the patient is undertaken. If none of the problems identified pose an immediate threat to the patient there is still a need to set priorities, because all the problems cannot be dealt with at the same time. Furthermore, the condition of the patient or the type of his medical treatment may be such that one problem should be given priority over another.

A useful guide to the setting of priorities can be found in Maslow's theory of the hierarchy of needs. This illustrates how the more fundamental needs related to physiological functioning and safety take priority over the higher level needs of self-esteem and self-actualization (Maslow, 1954).

Solving problems

Once the problems have been ranked in order of priority, it is necessary for the nurse to decide on the appropriate action if the problem is to be solved. The desired outcome in relation to each problem must be clarified.

Only when it is known *what* one wants to achieve is it possible to decide *how* it is to be achieved. When the desired outcome has been identified it is possible to measure the effectiveness of the care given by observing and recording the changes in the patient so that an

evaluation can be made of the progress towards achievement of the objectives (and solution of problems).

Effective decision-making is fundamental to successful planning. As each objective may well be achieved by a number of possible courses of action, during the planning stage the nurse has to select from these alternative courses of action. To do this she must have the information, knowledge, ability and skills to analyze and evaluate the alternatives in relation to the objectives set, in order to ascertain the most appropriate course of action for the individual patient.

The nurse's knowledge of the biological, behavioural, social and other sciences related to nursing, her previous experience, and her creativity will determine her ability to synthesize the alternatives available and, thus, the range of possible actions.

However, the most appropriate action is dependent, not only on these factors, but also on the knowledge of the unique situation of the individual patient, gained from the assessment and subsequent nurse-patient interaction, and on the correct identification of the patient's problems.

Setting objectives

Some problems may take longer to resolve than others, as they may require changes in the condition of the patient which can take place only over a long period. The objectives related to this type of problem are classified as long-term objectives. Those objectives related to problems that can be solved quickly are classified as short-term objectives. However, even long-term objectives can be broken down into shorter-term objectives that can be achieved more quickly than the overall objective, and which contribute to the achievement of the long-term objective. It is important that both long-term and short-term objectives are set with the patient, and the progress towards achieving these desired outcomes is pointed out to the patient and noted by the nurse.

The objectives should be written on the care plan and, written alongside them, the nursing actions to be taken to achieve each objective. Effective planning can be achieved only by communicating the plan to all concerned in the care of the patient. Participation, in the planning process, of as many people as possible, who will be involved in implementing the plan, is essential for the effective implementation of the plan (Koontz and O'Donnell, 1976). This can be achieved by arranging patient-care planning conferences at which all the nurses involved in the patient's care contribute to the identification of his problems, the formulation of alternative methods of nursing care, and the evaluation of that care

in relation to the desired outcome for each problem. This participation will help to increase the commitment of the nurses involved in the patient's care, to achieving the objectives set out in the plan. The plan also enables more effective control of the nursing care; unplanned action cannot be controlled effectively, because control involves keeping nursing activities on course by correcting deviations from the plan.

Without a plan of action it is impossible to assess progress towards the desired outcome for each of the problems identified. Evidence of this can be found in a study by Kratz (1974) in which she showed that, when the purpose of the nursing care was known the appropriate nursing action is brought into focus. However, if the purpose of the care was not clear the nurse tended to start care that was diffuse in nature.

Giving care

The actual giving of nursing care to the patient is the culmination of the assessment and planning stages described above. Planning alone will not ensure the successful solution of the patient's problems. Action is required.

This stage of the nursing process involves both the carrying out of the medical plan of care and the implementation of the nursing care plan. It is at this stage that the unique mix of knowledge from the biological, behavioural and social sciences, referred to by Hockey (1973) is applied to the individual patient's problems. This knowledge from the sciences underlying nursing will have been utilized in the assessment stage to focus the area of data collection, and in the planning stage to select decisions from possible alternatives. However, it is in the giving of nursing care that this underlying organized knowledge is applied, in the light of realities, to gain a desired practical result. Nevertheless, knowledge of the principles and theories of the underlying sciences will not, in itself, assure successful nursing care; one must know how to apply these principles and theories.

The function of the sciences is to search for fundamental relationships, for basic techniques, for organization of available knowledge in an attempt to provide explanations. It has never been the purpose of science and theory to prescribe what should be done in *all* situations. How knowledge is used in practice depends on the situation.

Basic assumptions or proved relationships can be borrowed from other disciplines, but they must be tested in the new context, that of

nursing care of people, before they can be truly accepted. It is the ability to select from the knowledge available to nurses to take action specific to particular patient's situation that comprises the art of nursing.

Concepts and theory

The application of the scientific method results in the formulation of principles which reflect or explain reality and therefore have value in predicting what will happen in similar circumstances. The practice of nursing can therefore be improved by a knowledge of the concepts, fundamentals, principles, theory and techniques of the underlying sciences and blending them into the unique mix which helps to build a theory of nursing. It is in the implementation of the nursing care plan that the nurse modifies the general principles of nursing theory to meet the particular needs of a patient or to alleviate his individual and unique problems.

Other factors influencing the delivery of nursing care, and thus the application of the principles of nursing to the patient's problems, identified by Duberley (1979), include the medical diagnosis, medical treatment, resources available, organization of the nursing work and the physical environment within which the care takes place.

Evaluation of the effectiveness of the care given

The preceding steps of assessment, planning and giving care cannot alone provide the information needed to improve nursing practice and hence the quality of nursing care given to the patient (Luker, 1979). Evaluation involves the collection of information which indicates whether or not the criteria set out for the achievement of each objective related to the patient's problems have been fulfilled.

Much of the information collected during the evaluation stage will be measurable data, such as the changes in the patient's temperature, reduction in the size of a pressure sore, a lessening in the amount of redness over a bony prominence or lessening of dyspnoea on movement. However, not all the data will be quantifiable, including such intangible factors as the quality of the relationship between the nurse and the patient, or whether a patient has learned a new behaviour related to his changed circumstances.

Evaluation is therefore made on the basis of the total, subjective and objective, data available to the nurse. Although it involves fallible personal judgements, the very nature of nursing care makes

it impossible to quantify all aspects, and therefore an element of judgement remains part and parcel of the evaluation process. Evaluation is a continuous and ongoing process. It should therefore be carried out throughout the delivery of nursing care, as well as on completion of the care plan. It begins as soon as nursing action is undertaken and whenever and wherever the nurse is in contact with the patient.

Feedback

The purpose of evaluation is to feed back into the care plan the results and the effectiveness of the care being given. This may sometimes lead to modification of the planned action. Evaluation and assessment are similar processes in that both involve the systematic collection of information; however, the goals are different. Evaluation is aimed at judging and improving nursing care, whereas assessment is carried out with the aim of identifying the patient's needs and problems before the care is given.

The most successful and useful evaluation is achieved when the objectives set in the planning stage are measurable. Measurable objectives are mirrored in outcomes, and all relevant outcomes should be included in the set of measurable criteria to be used in the evaluation stage (Ryan, 1973).

Theory development

The evaluation stage of the nursing process can also be used to test and refine nursing theory. A particular nursing intervention may be found to be applicable to a given patient problem or situation. If the evaluation continually indicates that the approach is successful, then this action may be embodied in nursing theory as a set of general principles that have been found to be effective.

Nursing theory should stem from, and must be tested in, nursing practice. The development of a predictive basis for nursing depends to a large extent on systematic documentation of both the intervention used and the outcomes expected (Mitchell and Walter, 1976). Evaluation is therefore of crucial importance in nursing for, as Murphy (1971) has indicated, much of the body of knowledge used in nursing is derived from the transmission of superstition, speculation and the accumulation of unrationalized experience. That is, much of the nursing taught and practised today lacks any scientific validity. It is, as Henderson (1967) stated, '... steeped in tradition passed down from one generation of nurses to another. Too often it is without rhyme or reason.'

As McFarlane (1977) has argued, nursing practice will not be on an adequate theoretical basis until nurses document the nursing process, so that practitioners can identify the cognitive process by which they arrive at certain decisions, and the relationship between nursing actions and their outcomes is indicated.

The on-going nature of the nursing process

The nursing process has been depicted as a circular process (Berggren and Zagornik, 1968) beginning with assessment and going through the stages of planning, giving care and evaluation before returning to the assessment stage again (*Figure 3.2*). It is important to realize that each step is ongoing, that steps may be carried out simultaneously, and that reassessment is an essential outcome of the evaluation process. However, it is equally important to appreciate that evaluation can take place only after nursing care has been given, and in relation to the objectives set. It should be remembered that a *return* to the assessment stage of the process is at a different stage of nursing care than was the original assessment, both in time and in terms of the patient's progress.



Figure 3.2 The nursing process as a circle

It seems appropriate, therefore, to represent the nursing process, not as a circular process, but in the form of a spiral (*Figure 3.3*), as the second assessment takes place only after the nurse has moved forward on the basis of the information gained in the initial assessment.

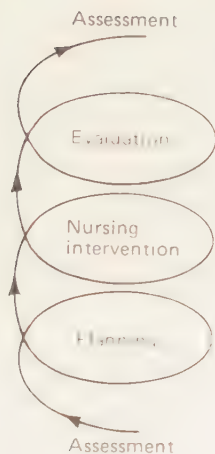


Figure 3.3 The nursing process as a spiral

Relationship to present patterns of nursing care

The steps in the nursing process are not exclusive to nursing. As Marks-Moran (1979) points out, they can be applied to any organized procedure. The steps of the process consist of a basic scientific framework or problem-solving approach. This is comparable with the process used in medicine, management and other scientific and professional disciplines. An organized process of care is used by all scientifically based practitioners in determining whether a client needs help, what kind of help is needed and if the help has been effective.

The nursing process, however, is a diagnostic and management process: the kind of information sought, the kind of intervention, and the outcomes expected, constitute the nursing focus of the process (Walter, Pardee, and Molbo, 1976). It is important to stress that the nursing process is a way of care and a way of thinking about nursing care. It is not limited to entering problems and plans on pieces of paper.

Because the nursing process starts with an assessment of the patient, the patient remains the focus of the nursing care as it is planned and delivered. This contrasts with the situation described by Hamilton (1979), who highlighted the deterioration in standards of nursing care which he attributed to the growing emphasis placed on a hierarchy of nursing and technical tasks—unrelated to the psychological, environmental, social and rehabilitative needs of the individual patient. This view is supported by Staunton (1979), who

pointed out that, unfortunately, while nursing knowledge has progressed, nurses themselves have become more and more involved with the tasks they perform rather than with the patients they care for, the emphasis being on getting work done, without reference to the quality of that care. He reflects the concern expressed by Basiak (1967), that '... nursing is falling into a state of incredible obsolescence. The gap between that which we know about nursing and what we practise, between that which we know needs doing and what is actually being done, is getting wider and wider.' It would appear that nurses are becoming increasingly dissatisfied with the task-orientated approach to nursing care.

Systematic approach

The adoption of the systematic approach to the delivery of nursing care embodied in the nursing process, and the philosophy that is inherent in this approach, which recognizes the wholeness of man, may offer a more satisfying and effective method of caring for patients. It is an approach that recognizes that the patient is more than the sum of his or her parts, and that each has personal and unique needs, desires, fears and abilities. This philosophy recognizes the '... subjective inner man who cries, hurts, smiles, laughs, feels, hopes, suffers, creates and seeks meaning' (Webb, 1979).

The nursing profession has been slow to accept change in its attitudes and, particularly, change in the practice of nursing care. Acceptance of the nursing process requires change in both attitudes and practice. Irrational resistance to the changes, and the failure to come to terms with the concept of the nursing process and to adapt for the future may well see the nursing profession doomed to the massive adaptational breakdown which Toffler (1970) has predicted.

Conclusion

Although, as Hockey (1978) has pointed out, '... there is ... a need for research into all stages of the process of nursing and most particularly into the sequences of the stages which constitute the process', the nursing process approach to nursing care has potential here and now.

No words illustrate this better than those of a British student nurse cited by Allen and Murrell (1978). 'In the past, ritualistic

performances of technical tasks . . . conferred high status on the nurse. These isolated technical tasks were given status, not the patient or the person.'

The nursing process encompasses a deliberate problem-solving approach to the practice of nursing. It provides continuity of care and reflects in its implementation the dynamic nature of the nurse's interactions with others, and highlights the interdependence of process and content in nursing practice.

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Scientific nursing research: art and science

ROSEMARY CROW

In the world at large, the word 'research' has become overgeneralized, with connotations ranging, for example, from no more than 'a careful search for information' to 'a systematic investigation towards increasing the sum of knowledge' (*Chambers Dictionary*). In addition to the problem of definition, there are three other difficulties which face nurse researchers engaged in scientific enquiry. First, nursing has barely started to develop its own science and is still in the very earliest stages of integrating knowledge from other disciplines. There is, therefore, as yet no agreed body of scientific knowledge. Secondly, research must provide knowledge relevant to nursing practice if it is to contribute to the development of a science of nursing practice. Thirdly, if the science of nursing practice is to realize its contribution to care, nurse practitioners, whether researchers or not, must be able to make appropriate use of the knowledge gained.

It is clear, therefore, that successful scientific research will not, alone, ensure that any advances made in the understanding of nursing practice are necessarily incorporated into everyday nursing practice. This requires that the profession in general values the pursuit of knowledge through scientific study, has ready access to the findings and has the skills needed to make use of such findings. I hope that this chapter will provide an understanding of the term 'scientific nursing research' and so identify the main components needed to ensure that it contributes to the advancement of a science which underlies nursing practice.

Nature of scientific research

Scientific research is directed towards solving problems. Enquiry therefore starts with particular problems and, as it progresses, moves to deeper and deeper levels. However, the method of scientific investigation is itself actually a mixture of art and science. As Beveridge (1961) illustrates, it is only the technicalities of research

which are specifically scientific, in the sense that science demands objectivity and rationality. The recognition of the problem, the identification of the questions and the generation of hypotheses are an art, dependent upon the imagination of the scientist.

To avoid a detailed philosophical discussion as to the nature of science, the view of Popper (1968, 1969) will be adopted: that science is concerned with events and objects in the real world which can be studied empirically, that is with facts and not with impressions or beliefs. The body of knowledge is then built up by rigorously testing the systems or theories developed to explain or understand the natural phenomena. As Darwin (1888) pointed out '... science consists in grouping facts so that general laws or conclusions may be drawn from them'. It is not the facts in themselves which comprise science, but also the explanations offered and the problems and hypotheses which are generated to arrive at a better understanding of them. It is also generally agreed that the unity of scientific knowledge lies, not in its material content, but in its goals and in the methods used to reach them. Pearson (*in* Beveridge, 1961) defines these as:

1. The classification of facts
2. The establishment of their mutual relations and sequence
3. The construction of vigorously verified conceptual models that subsume increasingly wide ranges of data.

Hence all science starts with description before it attempts to move on to causal analysis. This is a point that is sometimes overlooked by researchers striving for scientific respectability.

Thus, both art and science make up the process of scientific endeavour. The success with which scientific enquiry will contribute to the development of a science for nursing practice will depend largely upon the success with which relevant nursing problems are identified and translated into empirically testable statements, from which penetrating hypotheses are then generated to put the statements to the test.

Strategy of scientific research

There is, unfortunately, no certain way of ensuring that fruitful problems are identified from which useful hypotheses can be generated. One has only to read the history of both the natural and social sciences to appreciate that what characterizes the successful researcher is that elusive quality, imagination. All that can be given

are the guidelines to success. Beveridge (1961) lists these as follows.

1. Identify the problem
2. Make a thorough collection of field data or an equivalent observational enquiry/study
3. Marshal and correlate the information and then define the problem, breaking it down into specific questions
4. Generate the hypotheses in the form of possible answers to the questions.

These four steps must all be undertaken *before* there is any attempt to design the study to test the hypotheses. Each step represents a skill in its own right and, like all skills, has dangers which must be avoided. To illustrate this, areas encompassing three of the above steps will be considered in more detail.

Identification of the problem

The prerequisite for success in identifying a problem is a basic understanding of the subject. Without this, one cannot see that there is a problem awaiting identification. In nursing, this means being familiar both with the literature and the corresponding field of nursing practice. Through reading, one becomes aware of gaps and inconsistencies within theoretical systems. Nursing practice, on the other hand, provides the source for a potentially interesting association of events: it is the place where one identifies gaps in practical knowledge which hamper the decision-orientated procedure of the nursing process directed at affecting particular health problems (Downs, 1979). In essence, what this means is that successful research presupposes a knowledge of the subject. No researcher should therefore move into a new area of research until he or she has become familiar with the field of study.

However, skill is needed when selecting what constitutes necessary background information. Beveridge (1961) points out that it can be a hindrance when it is irrelevant, false, encapsulated within conventional or entrenched points of view (which are just as likely to be a narrow theoretical perspective as a strongly held opinion) or so detailed that the main issues become lost amongst the minutiae. On the other hand, Cleland (1977) warns that nursing research must not be used as a testing ground for theories that are of no great interest or pertinence to nursing practice. It is therefore wise to identify the nursing problem before a thorough search is made of the scientific literature. Nor should it be assumed that the science of nursing practice will be developed exclusively from research in nursing practice. As Downs (1979) says, practical problems which, for example, are concerned with care of the dying, or effective strategies

for managing pain, may ultimately yield effective answers only when analyzed from a highly theoretical perspective. On the other hand, theoretical problems concerned with phenomena that make up the science of nursing may well require clinical trials before they can be fully understood: indeed, Himsworth (1970) suggests that all scientific subjects need to look both inwardly and outwardly for their inspiration.

Advances in science are usually slow and laborious, and best achieved by coping with a very small research area at any one time. In the choice of a theoretical perspective, grand designs which aim to explain 'total' systems of behaviour are best avoided. Currently, examples of nursing research which have the developed potential to contribute to a science of nursing practice are: the study of stress (Boore, 1978; Wilson-Barnett, 1979); the control of pain (Hayward, 1975); the prevention of urinary tract infections (Cleland, 1977); and the prevention of pressure sores (Norton, 1975). All represent problems which are capable of empirical study, have been defined in terms of nursing practice, have integrated knowledge developed from another discipline to form a defined scientific framework within which the problem can be studied, and are the acknowledged concern of the nurse practitioner.

Collecting necessary field data

With the problem selected, the next step is to collect as much information about it as possible. Much has been written about the need to examine previous reports, and all researchers agree that this is a first and essential part of preparation (Lancaster, 1975; Treece and Treece, 1977; Abdellah and Levine, 1979). However, a stage that can be overlooked is that of either carrying out first-hand field observations or of asking different people about their observations of the problem (for example, in nursing one might seek the opinion and advice of experienced practitioners).

Observation is a much used word in research circles, having many different meanings. As intuition in what is observed, and the ever present need to reduce bias, both play such a key part in the planning of a scientific research programme, it is important that their sources are recognized. Briefly, the many connections which the term 'observation' has amassed in the field of research are as follows

1. When it describes the researcher's informal observations of potentially interesting events, or association of events (e.g. the health visitor may have noticed that mothers attend immunization sessions mainly in the afternoons)
2. When it describes the form in which the data are collected (e.g.

physical state of the wound in the course of healing; aspects of the patient's behaviour when in pain)

3. In relation to the methods used to record the observations (e.g. a grid to establish the size of the wound; event-recorder to record the sequence and frequency of behaviour)
4. When it describes the manner in which the researcher collects the observations (e.g. participant or non-participant observation)
5. When it describes the research design, where an observational study describes the recording of events as they occur in the real world, in contrast to an experimental study, which uses manipulative techniques to analyze events.

When collecting field data, the term 'observation' is being used to describe the informal and less easily prescribed skill of noticing potentially interesting associations of real-life phenomena, the source of inspiration which will ultimately form the basis of the specific hypotheses under test, or the more general aims of an exploratory study. This use of the word is captured in the first two of the descriptions given above. Descriptions three, four and five become important during the much later stage of planning, when the research design is selected. In addition, it is these latter aspects of observation which form the content of the relevant chapters in nursing textbooks concerned with research methodology; they will not be discussed further here (see Freece and Freece, 1977; Abdellah and Levine, 1979; Clark and Hockey, 1979).

The skill in this crucial earlier phase of collecting field data lies, essentially, in deciding *what* to observe. In common with the skill in selecting a problem, there is no ready formula for deciding what this should be. Calnan (1976) reports the sound comment made by Louis Pasteur that '*. . . chance favours the prepared mind*'. Certainly, for breaking new ground it is either the unexpected, chance observation that provides a lead, or the imaginative linking together of hitherto unconnected events. There are, however, several acknowledged sources of bias which the researcher must make explicit because of their consequences for the subsequent programme of research.

Bias

One important source of bias is that which influences what the researcher selects to observe. Although in science it is said that, to make a contribution, observations must be objective, there is no such thing as 'pure observation'; it can never, therefore, be unprejudiced. All our observations are based on decisions about what to select. Popper (1969) illustrates this through an example of

an exercise he set a group of students, who were required to take a pencil and paper, carefully observe, and then write down what they had observed. As he expected, the directive was immediately followed by the question 'What do you want us to observe?'

In research, bias enters through the theoretical perspective, the problem under investigation, the conjecture, the expectations and, in relation to practice, the dogma which purports to be fact.

As nursing science is still in its infancy, there is a serious danger that nursing research could place too great a reliance on a narrow theoretical perspective which has been taken from another discipline concerned with different research interests. Until serious problems in nursing science have been identified, it is vital that observation is directed at essentially *nursing* problems, otherwise, crucial issues which represent the real world of nursing are 'at risk' of being missed. For example, currently there are several approaches to the problem of ischaemic ulcers, using different theoretical perspectives. One approach is research designed to develop a 'pressure sensor' which can accurately detect the forces exerted at various sites of the body. The aim is to produce a ready means of detecting dangerous pressures in patients at risk of developing an ischaemic ulcer. The theoretical perspective thus focuses attention on the ramifications of the *forces* exerted on body surfaces (Kennedi, Cowden and Scales, 1976).

In nursing, as the practitioner is primarily concerned with the prevention of ischaemic sores, she/he needs knowledge of when, where and why they occur. It is already becoming apparent from other research approaches that 'pressure' is not the sole problem in the development of ischaemic sores, but includes more wide-ranging problems of patient care (Exton-Smith and Sherwin, 1961; Lowthian, 1977). For the development of nursing science which underlies their management, a theoretical perspective using only the concept of 'forces' may, therefore, not advance the understanding of the fundamental underlying issues because it may not direct attention to other clinical issues not seen as part of the problem of 'pressure'.

A second source of bias results from a failure to distinguish between observation and an interpretation of that observation. In nursing practice, *observations* refer to a variety of nursing activities which are concerned with monitoring the patient's current physical and or psychological condition. These include blood pressure, temperature and signs used to indicate the patient's level of consciousness, known collectively as the vital signs. Some of these measures are readings taken from instruments specifically designed to respond to certain physical properties of the body. For example,

blood pressure is a reading from an instrument which transforms aspects of the patient's circulatory system into a pressure measured in terms of millimetres of mercury. It is therefore *not* observed directly, but indirectly through the recording. Psychological states not infrequently said to be observed are depression, anxiety and pain. But these, likewise, are not directly *observed*, but are inferred states based on such aspects as the patient's behaviour, posture, expressed experiences or verbal statements, not directly concerned with either condition.

Interpretation can be avoided if both the physical and psychological aspects to be observed are defined in terms of objective, measurable criteria. This also ensures ease of assessing reliability and validity, as well as increasing the likelihood that the same measures can be used by other workers. For example, Barbenel *et al.* (1977) used the physical characteristics of size and colour to facilitate visual grading of pressure sores. For the observation of behaviour, Hinde (1966) has drawn a distinction between description of the physical aspects (e.g. position of eyebrows during face-to-face interaction) and description by the consequences of behaviour (e.g. patient fell over the chair). Classifying behaviour into categories must also be considered with care. What is usually taken into account is whether:

1. There are behaviours having the same form (e.g. facial expressions);
2. They have the same kind of consequence or effect upon the environment (e.g. those behaviours concerned with movement in space);
3. They occur in the same situation (e.g. behaviours that occur during a meal);
4. They share common causal factors (e.g. behaviours caused by fear).

The choice of categories used, ultimately depends upon whether they are useful in analysis as well as whether they are reliable and valid (Hutt and Hutt, 1970).

It is thus very important that observations are continually put to the test before the study is designed, especially if they concern frequently performed aspects of nursing care. Either go back to look again at what you have observed, having asked yourself searching questions about the reality of your findings, or ask someone else to comment on the same event(s) or object(s) so that you can compare records. Take care, too, when asking those who are not trained researchers, to describe what they have observed. As Beveridge (1961) points out, if not disciplined by training, people tend to

remember only those events which confirm their views. It is therefore worth spending some time exploring the problems with nurse practitioners who are not trained researchers, through tactful and patient enquiry. They have a great deal to contribute indirectly to the development of nursing science, often recalling observations based on a wealth of experience.

Generating hypotheses

A great deal has been written about the purpose of the hypothesis in nursing research and how it should be stated (Treece and Treece, 1977; Abdellah and Levine, 1979). Nevertheless, whatever help one gets from textbooks about the definition of an hypothesis, there is no ready way of learning how to generate those hypotheses which will prove useful. It is the imagination of the researcher which determines this, because hypotheses represent the intelligent guess, or 'hunch', in the scientist's attempt to explore the questions raised. Indeed, it is this speculation which is the breath of life so needed by the investigator, rather than a procedural cookbook. Nor is the value of the hypothesis solely measured by its success in getting positive results, but also by how good it is in stimulating further research in the quest for deeper understanding or new discoveries.

Even though the generation of hypotheses therefore represents the art of scientific endeavour, there are criteria against which the usefulness of hypotheses can be assessed. Calnan (1976) has identified five points which he suggests should be satisfied. These are:

1. They should explain the known facts
2. They should be consistent with all the known facts
3. They should be no more complex than necessary
4. They should aid prediction of new facts and relationships
5. They should be susceptible to refutation; i.e. be testable in terms as defined by Popper (1968).

Beveridge (1961), in contrast, warns against the danger of stating hypotheses which are too readily acceptable, because there can then be a reluctance to think of alternatives. In addition, always be alert to the danger of regarding your ideas as infallible. Once a hypothesis has been shown to be inconsistent with the facts, then it must be either modified or abandoned. As Zinsser (*in* Beveridge, 1961) has aptly remarked, '... people clinging to sterile ideas resemble hens sitting on boiled eggs'. Negative results must not, however, be confused with inconsistencies. It may well be worth pursuing a hypothesis, even though there is no immediate progress. However,

possible reasons for the failure or limited advance must be rigorously sought if the decision to continue is made. In nursing, potentially useful sources of problems from which hypotheses can be generated lie in putting long-held assumptions to the test. For example, in midwifery it was thought to be important to shave the pubic area before delivery of a baby, because this was said to be a more 'hygienic' procedure. Recently this assumption has been tested and shown to be erroneous (Burchell, 1964; Romney, 1980). Assumptions usually form the basis of the reasons which are given to justify nursing practice and, therefore, it is an investigation of these which may well prove to be useful for the development of nursing science. Nurse scientists, therefore, initially could do no better than to select a well-recognized area of practice in which they have an interest, to spend time investigating the varied assumptions held by different practitioners, and systematically to put them to the test.

Criticism

Where the generation of hypotheses forms the essential creative component of research, it is through the use of criticism that success in their testing is finally estimated. Thus, although not included as a step in the scientific method, criticism is an essential component of scientific endeavour. Every scientist must, therefore, learn both to accept criticism and to give it, always remembering that it is directed at the work done and not at personalities.

The critical attitude is one which encourages free discussion with the aim of discovering weak spots. Popper (1969) distinguishes it from a dogmatic attitude, which assumes that the aim is to discover truth or, in more everyday parlance, to prove that the results are correct. For example, in answer to the question 'Are all ravens black?', those holding a dogmatic attitude would attempt to provide positive evidence as an answer, whereas those holding a critical attitude would attempt to answer the question by searching for evidence of one raven which is not black. In statistical analysis, this strategy of falsification is seen in the form of the null hypothesis, in other words the hypothesis so stated that no relationship is expected between the variables under test.

Criticism in research must *not*, however, be thought of as an exercise in faultfinding. In scientific circles it should be constructive, looking for strengths as well as weaknesses. More usually, therefore, it is termed 'critical appraisal' or, as seems to be common among nurse researchers in North America, 'the research critique' (see Downs and Newman, 1977, for detailed discussion). Constructive

criticism, however, requires a thorough grasp of the subject, a working knowledge of statistical techniques and an ability to stand back and use reason rather than prejudice when making an assessment. Without these attributes, criticism is often no more than 'nit-picking' which, translated, means the raising of trivial or irrelevant objections. One crucial component of critical appraisal not frequently discussed is that of reason, which therefore warrants further examination.

Reason

Reason is the ability which is used to judge the validity of the conclusions drawn and hence the interpretation of the results. It is the activity described as rational argument. However, while reason is recognizable as an attribute, what contributes to its development as a skill is more elusive. At the basis of rational argument is logic, wherein is investigated, through the appreciation of rules of logic, the validity of the relation of consequence that holds between the premises and the conclusion in the argument (Mates, 1965). An argument is then said to be valid if its conclusion follows from, or is a consequence of, its premises. The means by which conclusions are drawn is through inference. Basically, in science there are two categories of inference: deductive or inductive. Deductive inferences are valid by virtue of their form, whereas inductive inferences go beyond the data given and so there is no definite criterion for assessing their validity. Logic, therefore, is concerned with the *form* of the argument and the procedure of drawing inferences. It does not test the *truth* or *falsity* of the premises; in science this is the role of research. Nor does the validity rest on whether the premises or conclusions are true; there can be valid arguments which have false premises and yet a true conclusion. It is important to recognize the distinction between validity and truth when criticizing, as misunderstandings may well follow from this confusion rather than from the results of the research.

For example, taking a hypothetical study concerned with an investigation of the role of speech as a source of stimulation for a sample of unconscious patients, it was found that all the patients studied responded to nurses when they talked at the bedside. From this result it was concluded that human speech acts as a source of stimulation for these unconscious patients. To examine the validity of this conclusion, the first step is to identify the premises and the form of the argument. Thus: (some) unconscious patients respond to nurses when they talk; nurses' talk is human speech; (some) unconscious patients respond to human speech. Given that the

premises (i.e. statements) are true, then the conclusion drawn in this example is valid, as it is a deductive inference which satisfies the rules of logic (*see* Mates, 1965). However, if the inference had been inductive, whence it would have been concluded that *all* unconscious patients respond to human speech, then there would be no logical means of assessing validity. Most inference in scientific nursing research is likely to be inductive, because it will be concerned with going from the particular to the general. There will also often be the added difficulty of premises defined as true under certain circumstances only. Hence, it will have to be accepted that reasoning is usually made in terms of probabilities, and therefore is more aptly described as speculation.

Beside the technical problems of inference, other potential sources of error are commonly made in reasoning. Henle (1962) has shown that attitudes, prejudices and past experience were all allowed to influence the conclusions drawn in deducting reasoning. In some cases, subjects unknowingly either changed the premise or included new ones to get the conclusions they wanted or expected. In inductive reasoning, on the other hand, Wason and Johnson Laird (1972) have suggested that dogmatic thinking can be a problem as it produces a refusal to entertain the possibility of alternatives. Another trap into which workers may fall is the confusion of facts with the interpretation of facts. For example, it may be a fact that when patients were given a certain drug, they slept well. It is, however, a generalization if it is said that this drug is a hypnotic for patients. Beveridge (1961) warns that the change from the past to the present tense usually involves stepping from facts to induction. Most inference is made intuitively and therefore not acquired through formal education. The best training in clear thinking and reasoning is the discipline and training of writing.

Conclusion

To be successful in scientific research, one must not only follow the rules of science but have skill and imagination. Dickoff, James and Semradek (1975) have suggested that the weakness of nursing research in the past has been its preoccupation with the procedural aspects of scientific endeavour, which they call the 'cookbook' approach. In comparison, little emphasis has been given to the need to select real problems which relate to the real world of nursing practice. The consequent danger is that problems become sterile, even though the research fulfils the demands of the scientific method. This criticism has a familiar ring, echoed by clinical nurse

researchers themselves (Cleland, 1977; Lindeman and Van Aernam, 1977). It is therefore essential that there should be a continual interaction between nursing research and nursing practice. On the other hand, it is important to recognize the forms in which scientific research has the potential to contribute to nursing practice. If these are not appreciated, then the development of a strong tradition in nursing practice research will be rejected because expectations are unrealistic.

First, there is the contribution when, through research, meaning is given to hitherto little-understood states or conditions, e.g. pain, anxiety or grief. Knowledge from this form of research enters nursing practice by providing the practitioner with greater insight into the patient's or client's condition. It would be misleading to talk about 'applying research results to practice' in this context, because the research contribution is ultimately through theoretical systems which develop the *nurse's* concept of the subject. Secondly, the results of some research can be used directly to plan care and thus can, in this sense, be applied. However, this is so under certain conditions only. For example, research has shown that, through the provision of a specially designed programme of teaching for groups of preoperative patients, nurse researchers can illustrate a change in their condition postoperatively which compares favourably with similar groups who have not experienced the same programme (e.g. Hayward, 1975; Boore, 1978). However, whatever the number of replications by different nurse researchers or practitioners, as long as the conditions remain the same, the results are still applicable for these groups of patients only. Thirdly, it must never be forgotten that the aim of nursing is to plan care for *individuals*, each of whose individuality lies in particular constellations of problems arising out of his/her specific needs. It is unlikely that any two problems will be the same, however similar they appear in form. This means that research will contribute maximally only if the results are matched to specific aspects of each problem, through the practitioner's skill in selecting that which is appropriate. If inappropriate results are applied, or results simply translated into lists and used in the form of a 'cookbook', then the research contribution may be lost or, at best, be minimal. As nursing science advances, so it will be the mutual relationship established between research and practice which will determine both the direction of research and the means by which it makes its contribution.

Because nursing is a dynamic process, it should come as no surprise that there can never be a straightforward application of knowledge. Nor can it be assumed that the same knowledge is relevant at different stages in the process of nursing, because the

information needed is different and/or the patient's condition may change (Crow, 1976). Clinical judgment—a key component in the art of nursing—will always determine the ultimate success with which scientific nursing knowledge underlies the practice of nursing. In this chapter, it is only the *approach* that the nursing research should take in the pursuit of scientific nursing research, that has been indicated. More precise application of research to specific areas of care can be further assessed in the light of some of the references cited.

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Nursing science: an unfolding in sequence

F. A. MCGILLOWAY

The nurse in early health care

An interesting outline of early health care structures is described in the book *Long Term Care* (Sherwood, 1975). It explains how primitive care structures involved primarily two people—the patient, and the healer who is usually depicted as a medicine man, sorcerer or priest. From the earliest times the patient and the healer represented the necessary and essential elements that still form the basis for any therapeutic relationship: one person seeking help, the other offering help.

If the healer is looked at more closely, two basic overlapping roles are found: the role of a 'knower' and that of a 'doer' (Millis, 1967; Magraw, 1968). The first role required certain specialized knowledge which enabled the healer to help solve a patient's problem: the second role involved the application of that knowledge. However, with the growth of knowledge and technical skills, a division of labour inevitably occurred and certain persons elected, or were assigned, to carry out certain tasks.

It is difficult to locate the nurse in early health care structures. She is easily seen as someone caring for children, sick relatives, the elderly, and friends, but it requires imagination to identify her in the formal healer-patient interaction without accepting her as the wise woman, or assistant.

It is not known at what point in the history of health care the division of labour occurred, but there is sufficient evidence to suggest that, when tasks involved the 'doer' role, they were the equivalent of those technicians in present terminology. If the tasks involved the 'knower' role they were closer to our current concept of the medical specialist.

However, this separation of roles did not reflect any important advances in the scientific base of medical care. These advances did not happen until the nineteenth century—the beginning of the era of modern medicine—when the physical and biological sciences began to infiltrate medicine (Sherwood, 1975). The nineteenth century also

found the emergence of nursing as a recognized activity in the delivery of health care.

A profession as well as a vocation

The tradition of nursing practice is that of the carer who needed no distinctive training, who learned in the light of experience to carry out and modify recipe-type methods handed down from predecessors. For some, for example, the Sisters of Charity founded by St Vincent de Paul in 1633, nursing, in its broadest sense, provided the means of expressing the love of God, and, through nursing the sick, the aged, caring for the widowed and lonely, it expressed the true spirit of the Christian Gospel.

Two famous Irish sisterhoods: the Irish Sisters of Charity and the Sisters of Mercy, with Pastor Heidner's deaconesses and Elizabeth Fry's Protestant nursing sisters, all of the nineteenth century, are other examples of people who have through nursing activities achieved a high degree of sanctity. It could be argued that, had Florence Nightingale appreciated spirituality as the mainspring of nursing orders, she might have joined one or herself founded one. Instead, she opened a career for lay people. No longer was serving without pay a prerequisite: nursing was to become a profession as well as a vocation.

While St Vincent de Paul appears to have been the first head of a nursing order who decided that his nurses should receive some intellectual training, and while Mother Mary Aikenhead, the founder of the Irish Sisters of Charity, sought to harness science and sound practical training to the service of the sick before Florence Nightingale was in her teens, the idea was not generally accepted until after the Nightingale reforms in the latter part of the nineteenth century.

There were, of course, those people termed 'nurses' who found themselves recruited to look after the sick without having the caring qualities to meet the needs of sick people. These characters—exposed to the suffering and weakness of fellow humans—'sometimes with a heavy propensity to heavy drinking, no doubt to make bearable the general offensiveness' (Baly, 1974) of the tasks at hand, fired the imaginations of writers of the day.

It was Florence Nightingale who opened a new era which dispelled the social stigma, differentiated between the untrained and the trained, and sponsored the issues of a vocation or profession, or both. Nightingale saw the nurse as an intelligent, responsible, practitioner, motivated by spiritual, but non-sectarian ideals, whose

skills were based on science and sound training. Nightingale's writings in 1859 mark the beginning of theoretical models in nursing and its emergence as a formalized range of activities.

Medical science and the art of nursing

A very useful text for an appreciation of the development of nursing as a science, and an art, is Riehl and Roy's, *Conceptual Models for Nursing Practice* (1974). They explain that physicians have always used one basic model for the theoretical orientation and application of their discipline. This model, which is offered to all students of medicine, provides coherence in communication and practice. It comprises a thorough examination of the patient's problem, and, based on his assessment, a selected treatment and evaluation over a period of time. The authors go on to say that Peplau (1970) describes the medical model in her statement that '... physicians address themselves to within—person phenomena—to dysfunctions, deficits, defects and the like in relation to the organism. They define the diseases of a person and prescribe treatment for them.'

For the nurse of the late nineteenth century, the orientation for nursing actions centred around a threefold objective: nursing for life; nursing for death; nursing for recovery. Children were nursed that they might grow up into good and useful men and women; old people that they might die peacefully and, as far as possible, painlessly; 'sick people' that they might, if possible, recover.

The theoretical framework, of the nineteenth century, consisted largely of environmental manipulations, and responsibilities comprised the provision of light, warmth, air and food, for the prevention of infection and the relief of its manifestations.

In the early years of modern nursing, almost all the reading material used by nurses was written by doctors, and the majority of nursing activities required obedience to medical directives and to the doctors themselves.

In 1888, O'Neill and Barnett, teachers of nursing, stated that '... the art of nursing is but the science of medicine applied' and '... those nurses who claim the title of artist and wish to live by their own art, must determine not only to conquer all its details and drudgeries but to learn all its principles of action; and more than this even to bring to its practice those dexterities of hand, those graces of manner, that power of instant discernment and adjustment which can only come from a heart pure in all its aims and cultivated in all its faculties. . . . Fifty years ago things were different . . . it is that nursing has taken quite a different and a higher rank than it once

had. It is commonly and justly coming to be held that nursing in all its branches is a career for educated women and everyone who can throw light on the best way in which nursing can be done commands general attention.'

Early indicators of a nursing science

According to Riehl and Roy (1974), it took almost a century from Florence Nightingale's statement, in 1859, that the goal of nursing was '... to put the patient in the best condition for nature to act upon him', for nurses to begin to define the principles of nursing, and while aspects of nursing theory are revealed in the textbooks of the intervening years the texts were largely procedure books. However, a few textbooks are worthy of mention: for example, Dolan (1968) describes Clara C. Week's *A Textbook of Nursing* (published in 1885) as the first nursing textbook to make a distinction between true nursing care and the mere execution of the doctor's orders. Dolan also refers to Lavinia Dock's *Textbook on Materia Medica for Nurses* (published in 1890) as another milestone, and to Diana C. Kimber's *Textbook on Anatomy for Nurses* (published in 1893) as the first scientific book written by a nurse for nurses.

According to Riehl and Roy (1974), as more standardized texts appeared, a brief definition of nursing emerged: the definition proposed that nursing was both an art and a science. As a science, the underlying principles of nursing care relied on a knowledge of anatomy, physiology and microbiology. On the other hand, as an art, one aspect of nursing was skill in observation, particularly the observation of symptoms.

Although these were early indicators that nursing was beginning to develop a conceptual framework to provide the rationale for nursing practice and enable nurses judiciously to apply knowledge in an autonomous manner, it was not until the latter half of the twentieth century that the impetus for such a framework occurred.

Concept, goals and patients

The 1950s found the mode of nursing education in the United Kingdom undergoing change. Nurses assumed teaching roles hitherto held by medical people. Education was being differentiated from training, and the policy of service-orientated activities for nursing students started to be questioned. The idea of 'student status' began to materialize, with the trend toward college- or university-based education for nurses, rather than training in a

hospital school. With more attention being given to the behavioural sciences and scientific method, it was not long before the art of nursing was exposed to concepts, goals and processes.

Although this description of the development of nursing education is restricted to the United Kingdom, it is true to say that these trends started much earlier in North America. It is also worth mentioning that, in many respects, other European countries are still backward in the development of nursing education (Hall, 1980).

The concept

The theoretical analysis of nursing action began with attempts to demonstrate how, for example, kindness to the patient is an important feature of nursing practice, and why nurses should be kind and comforting when meeting the needs of patients. While these approaches to ill people lie buried in an obscurity similar to that which conceals the beginnings of curative work in general, it should be noted that they were nursing sentiments requiring analysis.

Riehl and Roy (1974) describe how Peplau (1952), Harmer and Henderson (1955) and Orlando (1961) probed nursing intervention as a significant therapeutic interpersonal process. Peplau, in 1952, examined nurse-patient relationships, elements of the nurse's role, and showed how tension can exist on both sides of the relationship. Henderson defined nursing as '... primarily assisting the individual (sick or well) in the performance of those activities contributing to health, or its recovery (or to a peaceful death), that he would perform unaided if he had the necessary strength, will or knowledge. It is likewise the unique contribution of nursing to help the individual to be independent of such assistance as soon as possible.' This concept was further developed in Henderson's (1966) book *The Nature of Nursing*. In *The Dynamic Nurse-Patient Relationship* Orlando (1961) describes the nurse as one '... who offers the help the patient may require for his needs to be met, that is, for his physical and mental comfort to be assured as far as possible while he is undergoing some form of medical treatment or supervision.'

The goal

On pages 18 and 19 of *Conceptual Models for Nursing Practice*, Riehl and Roy (1974) draw attention to the evolving notion of a patient-orientated approach through the identification of the goal of nursing.

Alongside the development of the nursing concept, other nurses, for example Brown (1952) and Price (1954), began to focus their attention on the goal of nursing. By 1971, Smith, Germain and Gips claimed that nursing care involved:

1. Preventing, modifying, reducing or removing stressors
2. Supporting adaptive processes utilized by the patient in his attempts to establish a new state of equilibrium
3. Recognizing that applying stressors is a necessary part of the treatment process and that, in moderation, stress is necessary for life.

It should be remembered, however, that Nightingale (1859), more than a century earlier, stated that the goal of nursing was '... to put the patient in the best condition for nature to act upon him'. Nevertheless, it must be accepted that something more than conceptual and semantic equivalences are involved in the presence of scientific analysis.

The patient

The concept of nursing as an interpersonal process and the identification of the goal of nursing meant that nurses were better able to see the patient as a recipient of nursing care. The disease-orientated model borrowed from medicine offered, for nurses, a view of the patient only as an ill person, and all problem-solving centred about the management of the disease. However, the textbooks of Brown (1952), Shafer (1958), Abdellah *et al.* (1960) and Smith and Gips (1963), together, introduced discussions of the following:

1. Entire body systems
2. An integrated approach which stressed the nursing care of patients suffering medical and surgical conditions
3. An identification of basic nursing problems, thus delineating a patient-orientated concept based on human needs
4. Concepts basic to patient care relating to human developmental processes.

Patient-orientated care

During the period between the late 1950s and the late 1960s, an increasing number of nurses started asking questions such as 'What is nursing?' and 'How can we define nursing?', and it would be naive not to relate this, to some extent, to the sharing of responsibilities with other health professionals such as social workers, dietitians, and speech and physical therapists.

An interesting and important feature of this focus on definition was that clinical nursing, in attempting to recognize its reason for existence and in delineating its proper functions, was not just raising academic issues but was also outlining the basis for possible structures of control at hospital ward level, whereby knowledge could be applied in an autonomous manner.

It is both difficult and artificial to dissect out and examine the development of the science of nursing practice, without also considering the political economy of health care and the situation of economic stringency for the realization of professional aspirations; not to mention the interplay of political forces, and to direct attention at some dynamics in the development of the division of labour, and the distribution of resources within nursing and between it and other occupations. These factors are developed further by Muriel Skeet and Dr Elisabeth Hockey in later chapters of this book.

However, paralleling the development of the nursing concept and its goal, and the patient as a recipient of care, other nurses were examining patterns of care. For example, in *The Nursing Profession: Views Through the Mist*, Murphy (1978) points out that Hughes, Hughes and Deutscher, in 1958, stated that hospital nursing care was very unstandardized and that bedside care was no longer the principal occupation of the nurse. In addition, Reissman and Rohrer (1957), Bennis *et al.* (1961), and Corwin (1961) discovered a conflict between what the nurse perceived as her job and what she actually did. It was during this same period that McCain (1965), Rothberg (1967) and Young (1968) stated that it was knowing *when* to perform a nursing task, as well as *how* to perform it most effectively for a particular patient, that was significant to patients. The patient-orientated concept discussed in *Patient-Centred Approaches to Nursing* (Abdellah *et al.*, 1960) gained notable respect within a decade.

The nursing process

According to Riehl and Roy (1974), by 1970 the earlier stress on the art of observational skill had been expanded to include the systematic nursing assessment which emphasized the concept of the patient as a recipient of nursing care, and nursing textbooks began to include detailed discussions of this topic. One example is the book by Beland (1970) which includes a five-page Guide for data collection and nursing skill required to meet patient needs. Concurrently, greater emphasis was being given to nursing action based upon assessment. For example, Pellegrino (1961) argued that nursing on a professional level is not simply what the nurse herself does to or for the patient, but rather her perception of what needs to be done and

how to do it. The nurse decides those activities that can be done by others and those that she must do herself, based upon assessment of the patient and his clinical state. This was taken up by other nurses such as Little and Carnevali (1969) in their book *Nursing Care Planning*. They state that 'Systematic planning of nursing care is becoming a nursing responsibility of mounting importance. . . . These plans can set current priorities based on the nurse's synthesis of her knowledge and observation of patient response; they can be written and shared with those who participate; they can be viewed over time and improved upon; and they tend by virtue of the activities necessary to create them, to oblige the nurse to focus on the patient rather than on the task'.

Based on the development of the concept of nursing as an interpersonal process and its goal, and the view of the patient as a recipient of care, together with the questions being generated about patterns of care, the nursing process became the chief topic of discussion during the 1970s. In its most concise form the nursing process consists of '... assessing patient need, planning nursing action to meet that need, implementing the planned nursing action, and reassessing the patient need and its reapplication in a cyclic pattern' (Brodt, 1978). The concept of the nursing process has already been discussed in Chapter 3 by Ian Hargreaves.

Developing models and theories in nursing

Textbooks of the 1970s, for example, Byrne and Thompson (1972) and Burgess and Lazare (1973), began to refer to nursing models, and textbooks explaining specific theoretical frameworks had begun to appear (Rogers, 1970; King, 1971; Orem 1971; Riehl and Roy, 1974). In addition to the development of textbooks, an ongoing growth in model design is revealed in the journal literature of the early seventies (Roy, 1970; Neuman and Young, 1972).

Hazzard and Kergin (1971) define a model as '... a symbolic depiction in logical terms of an idealized relatively simple situation showing the structure of the original system'. It is therefore a conceptual representation of reality, and detailed theory-building generally follows the patterns set by the development of a model. In other words, the model provides the outline or sketch for which theory provides the working internal parts. The nursing model provides the basis for the framework for nursing practice, and the impetus and direction for nursing research. It also provides the basis for selecting knowledge to be transmitted in nursing education. 'Nursing shares the task of model building with all other fields of

scientific enquiry . . . each has made significant use of models in their historical development' (Riehl and Roy, 1974).

Model and theory development related to practice

During the 1970s, the efforts of nursing theorists to harness theory to practice led to the inevitable exposure of viewpoints based on deductive and inductive approaches.

Abdellah *et al.* (1973) argue that little has been done to develop models and theories in nursing and, while model and theory development related to nursing practice should be undertaken, '... the position is taken that nursing is an applied science, therefore the relationship of theory to nursing practice has not yet been defined'. Against this, Dickoff and James (1968) demonstrate that nursing practice can be related to situation producing theories (prescriptive theories) and describe the following aspects:

1. The goal to be achieved
2. Survey alternatives to achieve the goal
3. Choosing among alternatives
4. Prescriptions of activities necessary to achieve the goal
5. Implementing choice.

McFarlane (1977) holds the view that the relationship between nursing theory, practice, education and research are close and reciprocal relationships . . . '... but it is argued that the hub of the relationships is nursing practice as nursing is a practice discipline'. She suggests that many authors indicate that nursing has not progressed far beyond the level of identifying concepts, and that knitting these many concepts together is less likely to produce a unitary theory than a range of theories.

Riehl and Roy (1974) explain that theory can be derived either deductively or inductively. Deductive theory contains certain generalized premises which lead to logical conclusions, while inductive theory is made up of descriptive statements summarizing clusters of empirical propositions.

As I have argued elsewhere, nurses continue to apply the particular to the general. 'At this time the approach (an empirical approach) to develop theory and practice might be seen as offering only isolated, self-perpetuating or degenerating clusters of knowledge applied to specific situations based on the medical approach to illness; its basic weakness is its conceptual confinement. It becomes necessary, given the obvious limitations of the medical perspective and the lack of coherence within our own ranks, to aim to provide a base to facilitate communication; to codify, interrelate

and make available existing empirical knowledge. A basic theme, which promotes the cumulative development of knowledge and provides a plane of reference to which it is possible to relate findings and hypotheses is at least desirable. It is necessary to have a perspective which enables orientation to observation, problem choice, and the directions in which to look for variables in explanation of the less obvious and potential features of major problem areas. It is necessary to have a basic theme which makes the work of the practitioners meaningful in the dependency care sense, and the works of different researchers throughout the field commensurable' (McGilloway, 1979). My basic theme comprises orientations to dependency, illness behaviour, comparative analysis of nursing practice, particular problem areas, the application of theory to procedures of research, and the application of theory to procedures of nursing practice.

According to Riehl and Roy (1974), some nursing theoreticians follow the deductive method and select relevant concepts from other bodies of knowledge such as sociology, psychology and physiology. They begin with general concepts and use these as a basis for looking at specific nursing situations. Murphy (1971) summarizes the view of deductive theoreticians by stating that '... in essence, proponents of this approach suggest that theorizing in nursing is the result of modification, reconceptualization, and synthesis of concepts from other fields of knowledge as they describe and predict nursing practices'. Other theoreticians clearly present the inductive approach to theory building in nursing. The relationship of both inductive and deductive theory to a practice discipline is clearly presented in Dickoff and James (1968).

Returning to model building in relation to nursing action, in *Conceptual Models for Nursing Practice*, Riehl and Roy (1974) describe the systems, developmental and interactionist approaches in the provision of patient care. An article by Pierce (1974) offers a historical perspective of systems development and how a systems model can be used in the care of the patient. Pierce suggests that practitioners use this approach to determine the effectiveness of the nursing process. An article describing the approach by Rogers (1970) to systems theory points out that effective nursing action depends upon predictions that are based on scientific principles. The Neuman health care system model (Neuman and Young, 1972) presents a total-person approach to patient problems: the model focuses upon stress, emphasizing how the patient reacts to stress and how the nurse can assist him in coping with it. The Roy adaptation model (Roy, 1970) is concerned with assisting the patient to adapt in the areas of physiological needs, self concept, role function and

interdependency. The Johnson behavioural system model (Riehl and Roy, 1974) presents man as a collection of behavioural subsystems. Other models described in Riehl and Roy (1974), are the development models by Travelbee, and by Christman and Riehl, and also the interaction models of Riehl and Preisner.

Model and theory development related to research

Baly (1974) identified a number of difficulties in establishing a research tradition in nursing. 'The mist of emotion and drama surrounding nursing is not a favourable climate for cultivating objective study; traditional training has demanded obedience, not questioning, and questioning is the life blood of research.'

Baly (1974) also refers to lack of money, trained personnel for research purposes, and poor dissemination of results. However, she reminds us that since the World Health Organization suggested, in 1966, the provision of a framework within which research could be developed, the situation has changed with regard to funds for financing research and to facilities for exchange of information on research methods and results. An index on ongoing work, published by the Department of Health and Social Security, is now available in the UK. Publishers are now willing to print reports, and abstracting services and library collections of published works are also available.

In their book *New Directions in Patient-Centred Nursing*, Abdellah *et al.* (1973) argue that there is still a dearth of research concerned with nursing practice, throughout the world of nursing. Little is known about the dynamics of patient care systems. Only limited use is made of monitoring devices to assist in analysis of patient care data important for the prediction of the results of nurse actions. According to Abdellah *et al.* (1973), the limited amount of clinical research is due to enormous difficulties that have yet to be overcome: for example the lack of precise measuring instruments, the identification of criterion measures of quality nursing practice, and the development of models and theories that have relevance for nursing. Abdellah *et al.* (1973) state that '... until these obstacles are overcome the scientific basis for nursing practice cannot be studied in depth'.

According to Schlotfeldt (1975) '... the conceptual framework selected for a research problem influences the nature of the problem studied, the phenomena studied, the techniques and tools employed, the setting in which data are gathered, the methods of analysis and the use made of findings'.

The importance of *nursing* models for the development of nursing research cannot be overemphasized. Riehl and Roy (1974) state that

'... the nursing model provides the basis for selecting the aspect of reality to be observed. It provides the assumptions and values about nursing, the goal of nursing action, and also the focus and means of intervention'. They claim that a model is a theory at its first level of operationalization and go on to say that it '... guides the total research process, from defining the problem through confirming, or negating, the hypothesis. The nurse researcher is directed in her work by the variety of nursing models available'.

Model and theory development related to education

In 1888, O'Neill and Barnett, teachers of nursing, stated that '... for in teaching anything we always try to put before the learner a good model; something at which he is to aim; something that he is to copy. To set out by showing what he is to avoid is useless. He will soon learn what is bad when once the idea of what is good is firmly fixed in his mind'.

In 1972, Neuman and Young claim that the nursing model provides the conceptual basis, needed unity, coordination and integration for curriculum development and in 1974, Riehl and Roy see it as a schematic depiction of a theory. Today, the nurse is being educated to assume the role of an independent practitioner whose professional behaviour is based upon the existence of a body of scientific information. The principal activating factor which promoted this development was the post-war restructuring of the education delivery system. Among other things this resulted in the building of models and theories for nursing practice.

The future

From this brief review of literature, from Florence Nightingale through the 1970s to the present, it is possible to summarize and highlight the prevailing experience and opinions with regard to the development of nursing science and its application to nursing practice.

It would be foolish to overestimate what has been achieved, when Murphy (1978) can write that 'the conceptual framework of care patterns, and particularly their application into practice, has not yet evolved despite the fact that articles on patient-oriented care have appeared in the literature for nearly twenty years'. Nonetheless, there is some evidence of nursing science in all quarters as we enter the 1980s. The last half century has done much to encourage its growth: the next will do more.

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The influence of social policies on nursing

MURIEL SKEET

Politics. Social policy and the art of nursing

'History is past politics and politics past history'. Sir John Seeley. British Policy 1895

It was Prince Bismarck who said, when speaking in the Prussian Chamber in 1863, '... politics is not an exact science', changing his pronouncement some 20 years later to '... politics is not a science—it is an art'. But whether a science or an art, there is no doubt that politics—and social policy, from which it cannot be separated—have greatly influenced nursing.

It is highly probable that some form of nursing has existed since man began. For while nursing as an art to be cultivated and a profession to be followed is fairly modern, nursing as a practice probably originated when some cave dweller cooled the forehead of her feverish child with water from a nearby brook, or, yielding to inner promptings, left a well covered bone beside a wounded man abandoned during flight from an enemy (Osler, 1925). Historians, however, regard the mediaeval religious orders as being the true antecedents of the nursing profession.

This is probably one of the reasons why many authoritative documenters of nursing history date the profession from the Nightingale era (*for example* Austin, 1957; Abel-Smith, 1960; Henderson and Nite, 1978). Thus, nursing it is said, was '... born in the Church and inbred in the Military'. In recent years it could be added that nursing has been developed by science and shaped by politics—the latter not always being thought of as a science.

Reforms

Before Miss Nightingale's time, the standard of nursing in institutions was '... what each hospital chose to make it' (Abel-Smith, 1960). Paupers were nursed by paupers—uneducated, dirty

and sometimes drunk. 'Lectured by Committees, preached at by Chaplains, scowled upon by Treasurers, scolded by Matrons, sworn at by Surgeons, bullied by Dressers, grumbled at by Patients . . . (they were) insulted if old and ill-favoured; talked flippantly to if middle-aged and good tempered; tempted and seduced if young and well-looking—they were what any woman might be under the circumstances' (*The Times*, 1857). Reform came as a response to wider knowledge of these conditions (Howard, Nolan. *Poor Law Amendment Act, 1834*, and *The Lancet Sanitary Commission for Investigating the State of the Infirmaries of Workhouses, 1866*); increased scope of medical techniques, (the development of sciences as described in subsequent chapters); the work of reformers such as Louisa Twining, Elizabeth Fry and William Rathbone) and the recognition of the importance of bedside care.

Reform took the form it did, because it was meeting a social need—the provision of a suitable occupation for daughters of the upper social classes (Veblen, 1925; Simey, 1951). The performance of good works was already sanctioned by their class and promoted by the High Anglican Church. Making nursing 'respectable' was a logical extension of this providing a much needed outlet for social consciences and making use of some of the frustrated energies of the Victorian spinster (Paget, 1885; Abel Smith, 1960). While reform involved changes in recruitment, in organization and in the system of hospital accommodation, its main focus was on the introduction of training.

Probationer nurses

Although probationers represented cheap labour, the sheer increase in their numbers and the development of nurses' homes meant a sharp rise in hospital expenditure. Lady pupils were expected to pay for their period of training; the length of training for probationers was eventually extended to three years and trained nurses were hired out for private work at substantially higher fees than the salaries they received. (It could be argued therefore that the first nurse-employment 'agencies' began at that stage.) All these developments undoubtedly made a contribution to each hospital's finances, both in income it received and in the cheap service given to it by probationers.

With improved standards of hospital care, the number of patients in hospitals rose rapidly and cottage hospitals were established all over the country (Burdett, 1896). It has also been suggested by Abel-Smith (1964) that hospitals increased to meet the demands of the medical profession for facilities for teaching and practice.

It was then the turn of Poor Law hospital nursing to receive attention. The story of the three short years during which Agnes Jones transformed the notorious Brownlow Hill Parish Infirmary is well documented. While the success of the experiment was due to her courage, tenacity, sense of vocation and sheer hard work, it was made possible only by the financial sponsorship of the philanthropist, William Rathbone.

Liverpool led and London followed. A scheme was drawn up by the Poor Law Inspector from the Metropolitan area, with Miss Nightingale and Dr Sutherland insisting that although all inmates might remain under one central administration, the sick, insane, incurable and children should be accommodated separately. The Bill that made this possible, Mr Gathorne Hardy's *Metropolitan Poor Act*, was passed in 1867. From that date, reforms began in earnest. This separation of categories of people needing nursing care, led to the recognition of the need for varying training programmes for nurses, the setting up of different Registers and, eventually, to the various post-basic courses and the whole concept of continuing education. However, all this was comparatively protracted.

Even in 1900, it was still believed that admission to hospital was the precursor of death. This was not without statistical foundation. Consequently, those who could – the rich – avoided hospitals and entered them only to visit, inspect or govern.

District nursing

The effects of industrialization and urbanization and the social backgrounds of patients on the development of the British voluntary hospitals have been meticulously documented by Woodward (1974). Their ethos, reflecting that of Victorian society and *laissez-faire* government was one of 'disinterested pity and concern' to serve the population with greatest need—the 'deserving' labouring poor.

It has been claimed by White (1976), however, that during the 1920s the Poor Law nursing services were by far the major section of the British nursing services, caring for 75 per cent of all hospital patients at that period. The information is gleaned from her discussion about some of the political influence surrounding the *Nurses Registration Act, 1919*, in the United Kingdom. Referring to the '... political innocence of the nursing profession' at that time, she makes the very pertinent comment that: 'In considering the need for reform, Governments are influenced by established attitudes and if these are not detected nor understood, it is likely that the pleas of reformers will go unheeded.'

The urge among the upper classes to nurse the poor was therefore accompanied by a desire to be attended by nurses when sick themselves—but in their own homes. William Rathbone was moved to make this service available to the poor. From his modest beginning—with one nurse providing a service to a handful of patients—by 1865 the whole of Liverpool had been divided into 18 districts, each under the care of a nurse. A group of ladies undertook to supervise the work of each nurse, to pay for her lodgings and to provide necessary ‘nourishment and comfort’ for her patients. The administration of the system was deliberately based on the existence of a class of leisured women to supervise. Eventually a similar service was instituted throughout the country.

William Rathbone was also behind the movement which created the Metropolitan and National Association in 1874. He was a Member of Parliament by this time and set up a subcommittee of reference and enquiry. Its findings and recommendations proved to be the turning point in the history of district nursing. The Association eventually made Branch Homes independent by drawing upon local interest and liberality. Later, as a consequence of Her Majesty’s own personal interest, Queen Victoria’s Jubilee Institute was founded and became the focus of British district nursing training. A revision of the Royal Charter in 1924 changed the name to Queen’s Institute of District Nursing (now called the Queen’s Nursing Institute) and as such it has made an outstanding and unique contribution to the development of community nursing.

Both voluntary hospitals and workhouses suffered from the number of nurses who transferred to this branch of nursing, because no longer could hospital nursing ‘be left to just anyone’ (Pavey, 1938). On the other hand, the general public had little by which to judge professional competence and, indeed, had no way of knowing whether a woman was a trained nurse or not.

Registration of nurses

In 1886, the Hospitals’ Association appointed a committee to enquire into the possibility of establishing a general register of nurses. As a consequence of this and the indefatigable efforts of Mrs Bedford Fenwick, many Bills on the subject were introduced in Parliament during the period 1902–1910. All were unsuccessful. It was the First World War which brought a change of heart for, in part, the search for status was linked with the wider feminist movement of that time. Unity of purpose (especially to exclude wartime VAD members from peacetime nursing posts) and

willingness to accept change, were probably products of the war itself: a skilful letter written by Sir Arthur Stanley to all schools of nursing, proposing the formation of a College of Nursing, met with success and the College was registered with the Board of Trade in 1916. Among its objects was 'to maintain a Register of persons to whom certificates of proficiency or of training and proficiency had been granted'.

It is interesting to note that the articles of association specifically prevented the College of Nursing from '... imposing on its members, or supporting with its funds, any regulation, which, if an object of the College, would make it a Trade Union'. Recent social changes have led to many events in the history of the Royal College of Nursing of the United Kingdom, not least of which is that of 1978, when the College sought changes in its constitution and was subsequently certificated as a trade union. In that capacity, it is now a nationally recognized negotiating body and now represents the largest number of nurses in Great Britain.

The College Bill proved to be the basis of the Bill proposing State Registration for nurses, which the Ministry of Health successfully piloted through its various stages until it became law in December 1919, thus ending a 30 year struggle.

In fact, three Acts were necessary because of the three administrations of England and Wales, Scotland, and Ireland. Each country was empowered to set up a General Nursing Council for the purpose of carrying out the Act. The *Nurses' Act* of 1943 gave assistant nurses a recognized status in law: responsibility for compiling a Roll, drawing up a syllabus, inspecting and approving training schools and conducting examinations for admission to the Roll was again entrusted to the three British statutory nursing bodies.

The *Nurses' Act* of 1949 included the reconstitution of the General Nursing Council, providing a stronger educational element and an amalgamation of the register of male nurses within the general part of the register. Other clauses related to admission of nurses trained abroad.

This introduction of State Registration did not establish a precedent. The first Act entirely concerned with the Registration of Nurses was passed in New Zealand in 1901. By the beginning of the First World War, 24 States of America had arranged for registration of their nurses, as had Canada, Australia, Austria, Belgium and Germany. Today, nursing is a registered profession in almost every country of the world. Following the enactment of the *Nurses', Midwives' and Health Visitors' Act* of 1979, one central statutory nursing body has now been created for the whole of the UK.

The development of midwifery

The movement for the registration of nurses was also given encouragement by the registers set up for other professions. Within two years of the register of doctors being set up in 1858, a movement had begun for the registration of teachers (not yet fully realized in Britain). However, the most important precedent was the *Midwives' Act* of 1902 which introduced a register for midwives. The first Bill presented to Parliament on the subject was in 1878, and by 1891 both the General Medical Council and the Royal College of Physicians supported registration.

In both 1892 and 1893, Select Committees had reported in favour of the regulation of the practice of midwifery because '... a large number of maternal and particularly infant deaths, as well as a serious amount of suffering and permanent injury to women and children is caused from the inefficiency and want of skill of many of the women practising as midwives without proper training and qualification' (*Midwives' Registration Select Committee Report, 1893-94*). Evidence had been presented that there were unqualified midwives who did not use antiseptic or even soap and water, who deliberately suffocated the child and who dosed the mother with gin and '... many a woman has been a drunkard simply from that cause'. Moreover, unqualified midwives were reluctant to send for the doctor.

Thus, the Committee held that the registration of midwives would lead to more, rather than less calls on the medical profession. There was therefore little cause for the apprehension expressed by certain witnesses belonging to the medical profession, lest their interests might be injuriously affected by the improvement in the status of midwives. The Act of 1902 was far-reaching. A Central Midwives' Board was set up and the interests of existing midwives were protected by enacting that any woman should be certified by the Board who produced satisfactory evidence that, at the passing of the Act, she had been '... for at least one year in bona fide practice as a midwife and that she bore a good character' (*Midwives' Act, 1902*).

When, in 1918, the second *Midwives' Act* was passed, it became the duty of the midwife to call a doctor herself, if, in accordance with the rules of the Central Midwives' Board, this was necessary. The following year, when the Ministry of Health was formed, the Central Midwives' Board passed from the control of the Privy Council to that of the new Ministry. Although the Act of 1918 was designed to secure the better training of midwives and to regulate their practice, much yet remained to be done '... in order that the hazard of childbirth should be decreased and also the burden of disability and

invalidism due to lack of knowledge, absence of preparation and facilities for the birth'. The maintenance of an efficient midwifery service, it was recognized, was not only a medical and nursing duty, but was also of paramount biological importance, and constituted a social, economic and administrative problem which it behoved the State to solve. A solution could never be achieved merely by improved management of actual deliveries; competent antenatal and postnatal care were also necessary.

To meet this need, a more comprehensive *Midwives' Act* was passed in 1936. A very important and far-reaching provision of this Act was that the State should organize a service of salaried midwives who should be available to give antenatal advice and instruction to all pregnant women, to attend the actual deliveries, whether a doctor had been engaged or not, and to undertake the management and nursing for 14 days after birth. These postnatal duties are now shared by the midwife and the health visitor.

Abortion

Another related Act, but much later, was the *Abortion Act* of 1967. Although no longer 'deliberately suffocating babies', today's nurse is expected to participate in the destruction of fetuses. Rarely is the theatre nurse involved in the decision-making process which leads to an abortion, yet often it is she who is left with the fetal remains.

With the advent of intravenous infusions of pitocin, ward nurses are also involved. However, as a result of pressures from those organizations who represent the nurses and midwives, a 'conscience clause' was written into the Act, which enables any health care worker to refuse to participate in surgical abortion. Unfortunately, this provokes more problems than it was designed to solve (Smith, 1976).

Psychiatric nursing

The question of 'better regulation of madhouses' was the subject of serious debates in the British House of Commons for many years, led most strenuously by Lord Ashley (the Earl of Shaftesbury) who was a most vigorous and remarkable reformer of abuses connected with other sections of oppressed or helpless humanity. Fifteen Commissioners in Lunacy were appointed in 1828 and, on the strength of their report, the *Lunacy Act* was passed in 1845. Since that date, other Acts have been passed as amendments or as safeguards against possible evasion of certain clauses—especially with regard to certification of the insane.

In 1863, criminal lunatics were separated by the establishment of Broadmoor, built to carry out the provisions of the *Insane Offenders Act* of 1860. With this new era came the need for skilled and intelligent nursing, and subsequent advances in the psychiatric field have kept pace with rapid progress in other branches of nursing. Nursing programmes in many countries now include some psychiatric nursing training in the basic training curriculum of general nursing. Certainly, the interaction of mind with body processes is now so widely recognized, that all modern teachers of nurses include in their curricula some teaching of psychology.

Mental Health Act 1959 and Rights

The *Mental Health Act* of 1959 was a new charter for the mentally disordered. It abolished certification and put the treatment of mental disorder on the same footing as the treatment of any other kind of illness. It also emphasized the importance of community care. This, in turn, has led to an increase of lay involvement in the treatment of psychiatric patients, particularly through voluntary organizations such as the National Association for Mental Health (MIND). During 1980, among its campaigns in Great Britain was one relating to the right of psychiatric patients to vote in parliamentary elections. Their thesis is that such basic rights are not forfeited by admission to hospital. In addition, they assert that to deny patients such rights as they would enjoy outside, is to make their return to the community more difficult.

Health visiting

Various commissions were appointed during the first half of the nineteenth century for the purpose of investigating the administration of the Poor Law, the state of prisons, and asylums and the conditions under which the poor worked in factories, mines and brickfields. The reports of these commissions brought vividly before the public the hardships and filthy conditions under which the greater number of labouring classes lived. The investigations into the causes of local epidemics received a 'flood of light' from the developing knowledge of the relationship between the unhygienic conditions and the spread of infectious diseases, and this made it quite apparent that epidemics, for the most part, were preventable (Pavey, 1938).

Slowly it dawned upon the minds of the legislators, social reformers and all other interested members of the public, that the

problems had hitherto been attacked from the wrong standpoint. Once this idea had been grasped, the movement for the development of public health made strides.

The era began with the passing of the *Public Health Act* of 1848, which resulted in the establishment of a General Board of Health with the power to form local boards throughout Britain and to enforce measures for the protection of the health of the people. For many years, most activities of these boards concentrated on improving living conditions by the removal of refuse and excreta, the provision of pure water supplies and the improvement of housing. In industry, measures were enforced to ensure proper ventilation of workshops and factories and to mitigate the effects of dust and gases produced by various manufacturing and trade processes. A limit was placed upon the number of hours each week a person might be employed, and also upon the age of employees.

However, none of these measures could be really effective in the prevention of disease unless the people themselves did their part in following the laws relating to hygiene and sanitation. Their greatest dangers resulted from ignorance. In order to combat this, the public health nurse was evolved. Her remit was to care for people, to prevent illness and to advise and help families and individuals to build up their own strength and maintain their health. This remains as one of the chief functions of the British health visitor.

Responsibility for the education and training of health visitors was originally vested in the Royal Society of Health, but was transferred to the Council for the Education and Training of Health Visitors when it was created in 1962. The history of the early years of this council has been recorded by its first director, Dr Elaine Wilkie, who was a health visitor herself (Wilkie, 1980).

School nursing

National elementary education became available to British children in 1870, but school attendance was not compulsory until 1880. Only then was the incidence of sickness among children fully realized; it was the chief cause of absence from school and subsequent inefficiency in adult life.

In 1892, an enquiry was instituted into the feeding of London schoolchildren and from this it was suggested that a nurse be appointed to visit schools and to attend to the children's ailments. Five years later, the London School Nurses' Society was formed as a private charity. Again, as with all developments of British public health work, school nursing began as a voluntary effort of local people. The nurses so thoroughly demonstrated their usefulness that the London County Council took over the work in 1904.

The *Education Act* of 1906 authorized the giving of food to undernourished children, while the *Education (Administrative Provisions) Act* three years later, imposed upon education committees the duty of providing for systematic medical inspection of all children—sick or well—as soon as possible after admission to elementary schools, and of providing treatment for those in need of it. The *Education Act* of 1918 extended this duty of medical inspection (but without the provision of treatment), to all pupils in secondary schools. The *Education Act* of 1921, made it the duty of the Minister of Health to see that local authorities employed adequate school nursing services and, soon after, training in school nursing was included in the syllabus of health visitors.

Occupational health nursing

Although America claims to have led the way in industrial nursing when, in 1895, the Vermont Marble Company employed a nurse to visit the families of its employees, England appears to have an equal claim (Pavey, 1938). About 1875, a trained nurse was employed by Colman's Mustard Factory and this precedent was followed by Cadbury's Chocolate Factory in 1897. But the development of industrial—or occupational health—nursing is essentially a twentieth-century achievement. The two World Wars gave tremendous impetus to the work, for they considerably increased the needs for such services—especially in munitions factories. Welfare departments were established in all factories under governmental control in all belligerent countries.

Today, occupational health nurses must be conversant with the aims and scope of organized social services, recreational facilities, unemployment, sickness and compensation benefits and trade unions. In addition, there has been a plethora of legislation which affects their work: the *Clean Air Act* (1956); the *Noise Abatement Act* (1960); the *Factories Act* (1961); the *Offices, Shops and Railway Premises Act* (1963); the *Housing Acts* (1936–1969); the *Rent Act* (1968); the *Chronically Sick and Disabled Act* (1970), and the *Health and Safety at Work Act* (1974). The latter Act also necessitates the teaching and supervision of lay employees in elementary first-aid procedures.

From inmates of poor law infirmaries to patients with rights

In June 1871, the Local Government Board issued three orders for the separate administration of metropolitan infirmaries. Thus began

a decisive movement—the hospitalization of Poor Law infirmaries. Although, initially, progress was slow, it was to have profound effects on the service and education of nurses.

In 1897, the employment of pauper nurses in Poor Law institutions was finally forbidden and infirmaries were placed under the administration of a master and a matron. A medical officer undertook any surgical procedure required. For special cases, a medical consultant was called from one of the voluntary hospitals.

At the beginning of the twentieth century, all the larger infirmaries had a resident medical officer, a superintendent nurse, charge nurses and probationers, but an important change in their central control occurred in 1919 with the establishment of the Ministry of Health, which took over the duties of the Local Government Board.

The next epoch-making event was the passing of the *Local Government Act* in 1929 for, under its provisions, all the functions of the Boards of Guardians throughout the country—including the control of Poor Law infirmaries—passed to the County and County Borough Councils who were empowered to convert the infirmaries into general public health hospitals. This Act came into operation on 1st April 1930, and eventually more than 100 Poor Law infirmaries became ‘general hospitals’. The conditions upon which such a change could be made were that all aged and infirm inmates, apart from those who were also ill, were to be removed to other institutions. Units in the ‘new’ general hospitals were to provide treatment and nursing for acute medical and surgical patients.

The voluntary hospitals and the NHS

The great traditions of the large voluntary hospitals which thus developed, although an intangible asset, constituted a major power. They were based upon a selfless spirit of service and gave considerate kindness and personal courtesy to all who came within their walls. Those British nurses who were privileged to work in these hospitals with their characteristic charm and dignity, before the creation of the National Health Service (NHS) in July 1948 (*National Health Service Act, 1946*) were given an important and invaluable grounding upon which to develop the future nursing service, as well as personal standards of citizenship.

As Clark (1979) has documented, the British National Health Service is the product of a complex history. However, Schröck (1977) has very pertinently argued that nurses need to develop their critical abilities in the understanding and analyses of the socioeconomic and political background to the health service, of

which they are a potentially powerful group of health workers. She cites a number of causes which have engaged the efforts of nurses (and others) in the United Kingdom, namely the welfare of the elderly, the care of the mentally ill, the struggles for equal rights of minority groups, demand for family-planning premises, and facilities for legal abortion. These are cited to encourage nurses to develop political consciousness, for, she argues, '... health care, without politics, is simply not possible.'

The National Health Service, established under the new Act and implemented in 1948, had three main branches: hospital services, family practitioner services and the local health authority services. In the administration of the hospital services there were three tiers: the Ministry of Health, the regional hospital boards and local management committees. Under the general guidance of the Ministry, regional hospital boards planned, coordinated and supervised the development of the hospital services, while the hospital management committees were responsible for the day-to-day running of the hospitals.

Those hospitals which had medical schools were managed and controlled by boards of governors. The total membership of all these bodies ran to over 10 000 –every one of them an unpaid volunteer (Smith, 1976).

Reform

Discussions about the need to reform the health services began in July 1968, with the publication of a government green paper. At the time of the second green paper (1970), deliberations were also in progress regarding the future of local authority social services. The Seebohm Committee had recommended that social service departments be established by local authorities, each with its own Director of Social Services (Seebohm Report, 1968). These were to take on certain responsibilities, some of which, such as the home help service, had previously come under the 'health' umbrella. This, together with the unification of the National Health Service on 1st April 1974, had many implications for nurses. Not only did many find themselves applying for their own posts (all previous health authorities ceased to function on the date of the reorganization) but the functions previously discharged by the former local health and hospital authorities, together with the functions of local education authorities relating to medical and dental inspection and treatment of school children, were brought together under the new health authorities. Nevertheless, the reorganized National Health Service provided nurses with a great opportunity to influence and determine the nature of health service organization and health care delivery, by

virtue of their newly created roles as members of management teams.

Influence was now possible, not only at executive level, but also from the 'grass roots'. Clinical nurses and other nursing practitioners were able to exert influence by virtue of the creation of district health-care planning teams (Smith, 1979). There were also other opportunities for influence via the representation of all categories of nurses on the statutory nursing and midwifery advisory committees (Clay, 1976).

The new three-tier system (in England) and two-tier system (in Scotland, Wales and Northern Ireland) meant that nurses at these levels required management, counselling, planning, monitoring, coordinating and communication skills. They also faced an increase in litigation threats and frequent sporadic outbursts of industrial action by NHS workers. In addition, they were expected to collaborate with local government via Joint Consultative Committees, and with the 'consumers', through Community Health Councils (CHCs). The basic job of CHCs was said to be '... to represent the interests of the public in the health services in its district, to the Area Health Authority'. The white paper on *Reorganization of the NHS* also suggested that the CHC '... may provide information and advice about procedures for individual complainants and be the "patient's friend" when needed'. The *Report of the Committee on Hospital Complaints Procedure* (DHSS and Welsh Office, 1973) stated that '... this is an age in which the legitimate interests of the consumer—who, in the hospital is called 'patient'—are rightly receiving increased protection in many fields. Correspondingly, responsible management in those fields is acknowledging that it is accountable for the service which it provides'. It made provision, by external checks and safeguards, for those unable to look after their own interests, especially those mentally sick, handicapped or in long-stay wards. In addition, a Health Service Commissioner was appointed by Parliament to represent the consumer. All complainants have the right to ask this Commissioner to investigate their grievances. To assist them, they may turn to a community worker, a member of the Community Health Council, a local councillor or to a member of one or other of the non-governmental organizations: for example, for psychiatric patients there is the National Association for Mental Health (MIND).

Patients' rights

One of the most resistant problems of the health services, and particularly of hospital service, has been the dissatisfaction

frequently expressed by patients with the amount or quality of information given to them about their condition, treatment and prospects. The American National League for Nursing (NLN) has urged the nursing profession to assume a greater responsibility for informing patients of their rights and in assuring the protection of those rights. They point out that '... since the patient is cared for directly by a number of individuals, collectively called the health care team, and since the actions of many others indirectly involved in his care may also impinge on his rights, any statement of patients' rights inevitably involves implications for a variety of people. In many cases, nurses can directly involve themselves in assessing specific rights; in others they can make their influence felt indirectly' (NLN, 1978).

The Royal College of Nursing of the United Kingdom published a discussion document, *Code of Professional Conduct*, in 1977 and set out the responsibilities of nurses to patients (or clients) for professional standards, to colleagues, and as citizens of a State. The starting point of this document was the recognition that nursing is a profession in its own right with 'all the responsibility that entails'.

The American Hospital Association has written *A Bill of Rights for Patients*, (Figure 6.1) now used by many hospitals in the USA and given to patients on admission to hospital. The 'Bill' describes the patient's rights to complete and understandable information about his health problem; to informed consent for all treatment (including the use of experimental procedures); to privacy and confidentiality; to a full explanation of costs, and to refuse treatment. As Henderson and Nite (1978) point out, the rights of patients extend to all settings, from private surgeries to prisons, and influence many practices, from abortion, through care of the dying, to organ transplantation. Nurses cannot but be involved, and a commitment to safeguarding patients' rights should be '... inculcated at an early level in the nursing curricula'. Likewise, in nursing service the concepts of rights must be continuously upheld and reinforced. The NLN challenged the nursing community to put its belief in the validity of patients' rights into practice, to make the ideal a reality, thus taking a significant step forward in providing better 'health care for all people'.

As already noted above, since the reorganization of the British National Health Service in 1974, a health consumers' watchdog has been established, namely the Community Health Council (CHC). In each health district there is a CHC made up of members of the public who monitor the services on their behalf, protect their rights generally and help to investigate complaints on their behalf if necessary.

BILL OF RIGHTS FOR PATIENTS

In the interest of "more effective patient care and greater satisfaction for the patient, his physician, and the hospital organization," the American Hospital Association has adopted a "Patient's Bill of Rights" as a national policy statement and distributed it to its member hospitals throughout the country. Intended to "give the consumer something to go by," the 12 rights, in summary, are:

1. The patient has the right to considerate and respectful care.
2. The patient has the right to obtain from his physician complete current information concerning his diagnosis, treatment, and prognosis in terms the patient can be reasonably expected to understand.
3. The patient has the right to receive from his physician information necessary to give informed consent prior to the start of any procedure and/or treatment.
4. The patient has the right to refuse treatment to the extent permitted by law, and to be informed of the medical consequences of his action.
5. The patient has the right to every consideration of his privacy concerning his own medical care program.
6. The patient has the right to expect that all communications and records pertaining to his care should be treated as confidential.
7. The patient has the right to expect that within its capacity a hospital must make reasonable response to the request of a patient for services.
8. The patient has the right to obtain information as to any relationship of his hospital to other health care and educational institutions insofar as his care is concerned.
9. The patient has the right to be advised if the hospital proposes to engage in or perform human experimentation affecting his care or treatment.
10. The patient has the right to expect reasonable continuity of care.
11. The patient has the right to examine and receive an explanation of his bill regardless of source of payment.
12. The patient has the right to know what hospital rules and regulations apply to his conduct as a patient.

Figure 6.1 The American Hospital Association's Bill of Rights for Patients (summary form). (From Nursing Outlook (1973) 21, 82)

A voluntary organization—the Patients' Association—has also done much to promote health care consumers' rights, particularly those in hospitals. In the United Kingdom there is also an independent Health Advisory Service (HAS). The HAS is financed by the government health departments but is not controlled by them. The HAS consists of teams of health administrators, nurses and doctors, therapists and social workers, many of whom are given temporary appointments (on leave from full time jobs) who together visit the geriatric and long-term care services and report on them, to ensure that these particularly vulnerable client groups are protected from the possibility of inadequate care and insufficient health resources.

Uneven distribution of health care

In a number of countries, health care is unequally distributed and is uneven in quality. Services are underutilized in some areas and overutilized in others (Maxwell, 1974). Countries with universal health insurance and national or provincial health programmes have established quantitative and qualitative standards through planning. Illustrations of these inequalities can be found in the publications *Health Trends* and *Social Trends* (HMSO.).

The USSR and the People's Republic of China are examples of countries in which there is thorough standard-setting and preparation of categories of health workers. Canada has a national health service administered province by province, the plans differing in each. The *National Health Planning and Resource Development Act* of 1974 in the USA has resulted in similar planning in which nurses are involved (Scott and Levine, 1977). All these commit the nursing profession to a continuous assessment of needs and resources.

In the United Kingdom the use of volunteers as a source of manpower has been the '... backbone of English social life', and has been encouraged by successive governments, but today's nurses are reluctant to use volunteers (Skeet, 1977). Patients, however, have formed their own groups, categorized either by disease (for example, the British Diabetic Association) or by treatment or procedure (such as the Colostomy Welfare Group). Through these they provide mutual aid, encouragement and advice. The Patients' Association also exists to help, advise and, if need be, to take action on behalf of patients. Developing countries are also turning more to self-reliance and community care, through patients choosing, training and sometimes paying their own health workers. Thus health care has come to 'belong' to the people it is designed to serve. Even in the British Welfare State, where health care is free at the point of delivery and available to all, irrespective of social class, sex, age, or creed, inequalities of uptake of health care exist and persist.

The influences of social class background on the use of health services has been highlighted by many, including Waddington (1977): the lower social classes not only tend to be consistently in a poorer state of health, but tend to make less use of the free health services than do the upper social classes. The particularly marked ~~phen~~ of the handicapped has been documented by Oswin (1978): for a variety of reasons, such patients fall through the 'holes in the welfare net' and are neglected and often forgotten. These pose challenges for all citizens and health care workers, especially for nurses, as has been argued by Smith (1979b) in an inaugural lecture to the 1979 annual seminar of the Health Education Council.

Industrial relations

Since the 1970s an enormous change has taken place in the climate of industrial relations, in the volume of industrial relations work required of managers and staff, and in the attitudes to industrial relations activity. These changes have had implications for senior nursing management, as well as for other staff in the NHS. They have also had implications for the nursing profession's organizations and official bodies in terms of structure, organization and policy.

There have been five key indicators of change. The first was the increase in trade union membership, changing the NHS from a poorly to a highly unionized service, with corresponding changes in the relationships between managers and staff at the operational level. The second was the appearance of large numbers of union stewards and representatives—all with special rights and responsibilities to be active in the field of industrial relations in a service where, previously, they were non-existent. The third was the multiplicity of industrial relations legislation (for example, the *Trade Union and Labour Relations Acts* of 1974 and 1976, and the *Employment Protection Act* of 1975) each requiring industrial relations activity at the operational level. Through the Codes of Practice subsequently produced by the Advisory, Conciliation and Arbitration Service (ACAS) they seek to set out procedures governing the discipline and dismissal of staff, the handling of grievances, the regulation of time off for trade union stewards, the disclosure of information and the establishment of Health and Safety Committees. The fourth development has been in the field of Workers Consultative Committees within the NHS and the occasional exclusion of the professional nursing and midwifery organizations (because they are not affiliated to the Trades Union Congress). In some parts of Britain, participation became an increasing industrial relations irritant in the late 1970s.

Perhaps the most traumatic indicator of industrial relations change has been the appearance and growth of industrial action within the NHS. Whenever this looms, it makes industrial relations management take priority and forces senior nursing managers to give more of their time to the business of containment. It is no exaggeration to say that the industrial relations situation in the NHS in the 1980s is radically and dramatically different from that even of the previous decade, and it is one to which individual nurses and their professional organizations have had to adjust. Nevertheless, in spite of large-scale industrial chaos in the British Health Services in 1979, both the Royal Colleges, of Midwives and of Nursing, have reiterated their commitment 'not to strike'.

Worldwide influences

The Women's Movement

By the time of the American Civil War, the Woman's Rights Movement, demanding that women be given the right to enter the medical profession, had already laid an effective basis for changes in nursing. Although there was still some unwillingness by male physicians to accept women into their profession, they had no doubts about nursing being a suitable occupation for them. The Civil War proved the importance of nursing when Ladies' Aid Societies sprang up all over America. These Societies gave women their much-desired entry to hospital work.

After the end of the Civil War, a special committee was formed to investigate the setting-up of what the president of the American Medical Association (AMA) had called '... institutions for the education of persons whose duty is to take care of the sick'. In 1869, the committee reported that '... there is a marked diminution of mortality in hospitals where nursing is done by trained women, a decided decrease in expenditure and a great improvement in the moral character of the inmates'. The committee recommended that district schools be formed (under the guidance of the county medical societies) for the training of nurses.

This changing image of the nurse, together with pressure from popular women's magazines calling for better nursing care, led to the setting up of three training schools, patterned on the English model, within a 6 month period (Bullough and Bullough 1969).

Economic factors

Once nursing reform was under way, it began to proliferate. Early nursing schools quickly demonstrated the validity of the findings of the AMA's special committee. In an attempt to save money, therefore, hospital administrators pushed for the establishment of more nursing schools (Bullough and Bullough, 1969). Although the theory was that the students worked for their instruction, too often teaching suffered because ward work was given priority. Nevertheless, as nursing was one of the very few professions open to women, students flocked to the schools. Another reason for the increase in nursing schools in the USA was the proliferation of hospitals, attributable not only to the advances of medical science, but also to the rapid growth of the country's population.

Miss Nightingale's influence was also felt in other parts of the world. After becoming a member of the Royal Sanitary Commission on the Health of the Army in India, her work for military hospitals in

that country led her to strive for the health and welfare of all people in India (Nightingale, 1863). By 1887, not only did a great many hospitals in England, Wales and Scotland have matrons or superintendents trained at the Nightingale School, but parties of Nightingale nurses had gone to Australia, Canada, India, Ceylon (now Sri Lanka), Germany and Sweden.

Other reasons for the growth of nursing were the formation of the Red Cross, the growth of imperialism and the expansion of medical missions.

The Red Cross influence on nursing initially was not strong in the United States or the United Kingdom, but in most of Europe it became a semi-official agency of governments, enjoying both national and international prestige. In Germany the rise of secular nursing was also aided by Women's Movements. In Switzerland also Holland and other Protestant countries, it was shared with the religious societies, while in Russia the Red Cross completely took over nurse-training.

In France, nursing reform came only after the defeat of the French in the Franco-Prussian War, during which the inadequacy of French nursing had been clearly demonstrated. The Municipal Council of Paris, when deciding to reorganize all city departments at the end of the war, particularly included the hospitals department. But the so-called 'reformed' schools in 1878 were little better, and it was not until 1907 that Anna Hamilton established a programme under the direction of the Director General of the Department of Public Charities, in Paris. Dr Hamilton went on to introduce Nightingale methods into Spain, but reform there was slow because of the uninfluential position of women in Spanish society. Other English women, Amy Furrer and Edith Cavell, led reform programmes in Italy and Belgium respectively.

In 1909, a Red Cross Nursing Service was formed in the United States and this was instrumental in helping to establish (or re-establish) training schools in many of what are today, Latin American countries.

Western imperialism

One of the indirect results of Western imperialism was the introduction of its own forms of medicine and nursing to many countries of the world. The Americans, as an aftermath of the Spanish-American War, helped to establish modern nursing schools in Cuba, the first being opened in 1899. After the American occupation of the Philippines there was a demand for nurse-training schools there, although it was not until 1907 that one was

established. By treaty, the United States was committed to provide education and medical care for the native peoples of Alaska. This included the establishment of hospitals and, eventually, of training schools. After the US marines occupied Haiti in 1915, a nurse training school was established there.

Many of the British Commonwealth countries developed nursing along the English pattern. Theophilus Mack, with two Nightingale nurses, organized the first training school in Canada at St Catherine's, Ontario in 1874. Montreal sought advice on training from Florence Nightingale while Toronto took steps to set up a nurse-training school as early as 1877, although it was not actually established until four years later.

Missionary groups also helped to train nurses in China and Japan. Japan was later instrumental in taking nurse-training to Korea and Taiwan.

The wife of the English Governor-General founded the first training school in India at Bombay in 1886, but unfortunately the caste system of the country severely handicapped the development of nursing until more recent years. There are still fewer nurses than doctors in India (as well as in Bangladesh) and this makes it difficult to maintain high standards of bedside care.

In Africa, nursing programmes were instituted by various imperial powers, by the Red Cross and by missions. Especially important was the Princess Tsalai Memorial Hospital and Nursing School of Ethiopia, established by Emperor Haile Selassie in memory of his nurse daughter who died shortly after completing her training in England. In the Republic of South Africa, the first nurse-training school was established in the 1880s, while the first nursing registration in the British Empire was at Cape Colony in 1891. In French Africa, few Africans became nurses and it was not until 1951 that a nursing school was opened in Dakar. Dr Albert Schweitzer's nurses were also inadequately trained by today's standards and it was not until after his death that reforms could be introduced there.

Women of Latin countries were not encouraged to study, and nursing was considered to be the work of servants. Effective reforms did not take place until Latin American physicians and surgeons began to take postgraduate studies in the United States after the Second World War.

The World Health Organization's influence

At its founding in 1948, the World Health Organization (WHO) stated that '... enjoyment of the highest attainable standard of

health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition'. Since that date, working with the governments of its member states, WHO has aimed to hasten the establishment of national health schemes on every continent. In recent years, however, (Thirtieth World Assembly, 1977 and Declaration of Alma Ata, 1978), while reaffirming that health is a basic right and a worldwide social goal, member states decided that '... the main social target of governments and WHO in the coming decades should be the attainment, by all citizens of the world, by the year 2000, of a level of health that will permit them to lead a socially and economically productive life'.

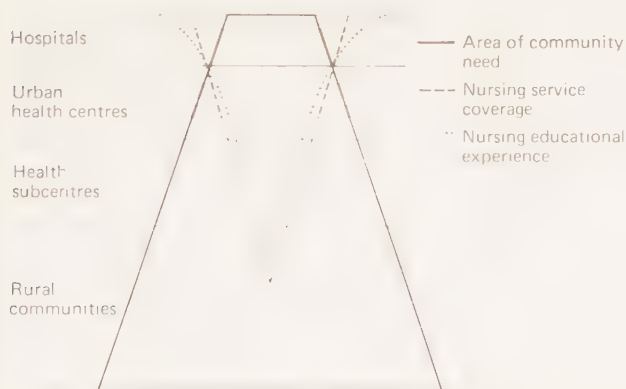


Figure 6.2 Existing nursing services related to community need and educational experience

At the International Conference on Primary Health Care, held jointly by UNICEF and WHO in 1978, it was agreed by delegations from 134 governments and by representatives of 67 United Nations Organizations that primary health care is the key to attaining this goal. If this approach is used throughout all member states, it will be the greatest influence of social policy, in the attainment and maintenance of health throughout the world.

The primary health care approach has evolved over the years, partly in the light of experience, both positive and negative, gained in basic health services in a number of countries (Figure 6.2). However, it is much more than the mere extension of basic health services: it has social and developmental dimensions, and, if properly applied, will influence the way in which the rest of the health system functions. Primary health care is delivered by

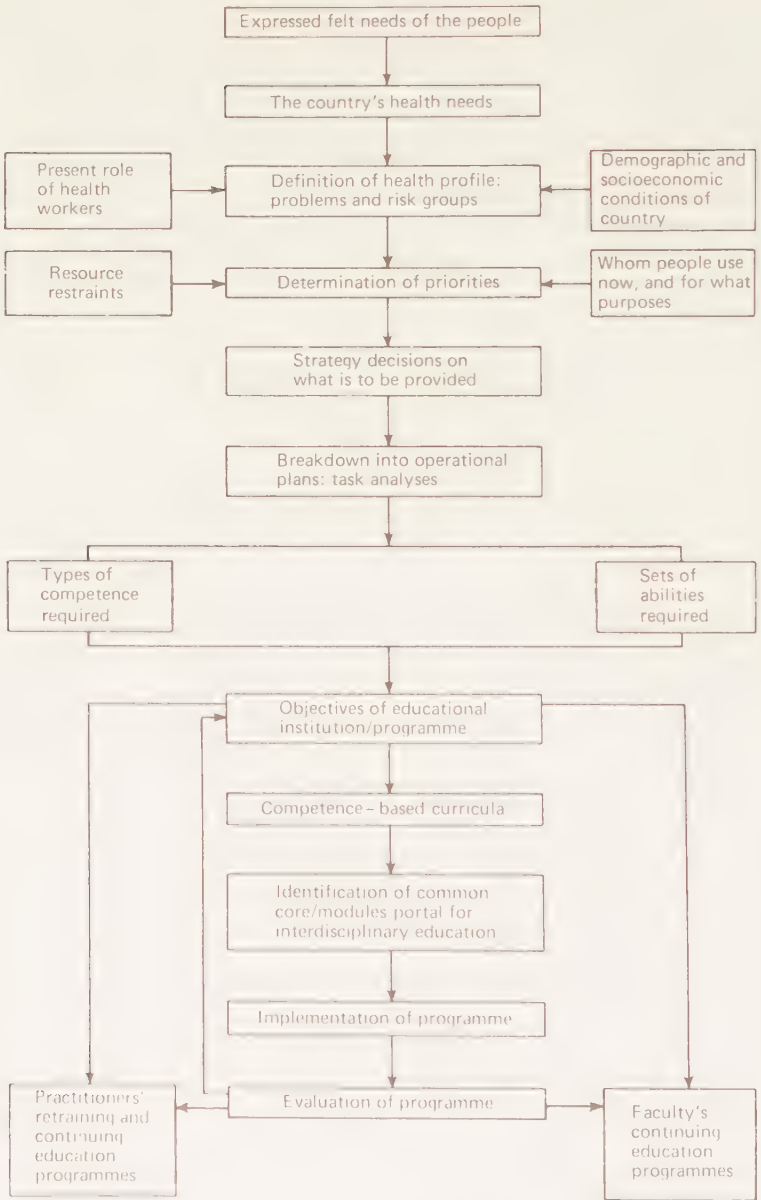


Figure 6.3 Primary health care: influence of community participation on educational programmes for health professionals

community health workers. The skill these workers require, and therefore their training, will vary from country to country and even from community to community. Whatever their level of skill, it is vital that they understand the real health needs of their own communities and that they have the confidence of the people they serve. For this reason they will live in the community *with* the people they serve, and, in all probability, will often be chosen *by* the people they serve. Support and supervision from other levels of the health system are essential for the effectiveness and efficiency of primary health care. Workers must be able to rely on more skilled people for guidance and referral, and the service itself will need financial and logistic support.

However, just as the primary health worker cannot 'go it alone', neither can the community. In order to help itself, the community, in both developing and the more developed countries, requires continuous help in various forms (*Figure 6.3*). From the health system it will need education about the causes and prevention of disease and accidents. It will need information concerning the implications of proposed solutions to problems and it will need guidance on meeting the costs of adequate continuous supplies of basic drugs and appropriate facilities and equipment.

Because the introduction of primary health care into communities will greatly increase the demands on existing services in terms of training, supervision, logistic support and referral care, a redistribution of functions amongst health staff is called for.

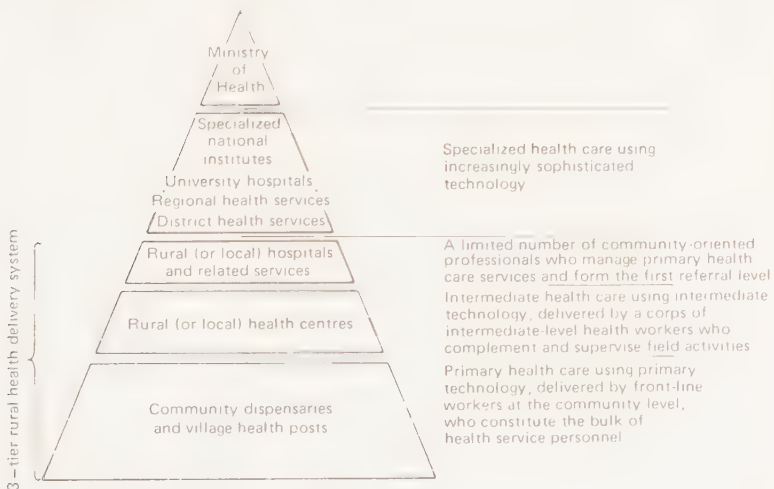


Figure 6.4 Pyramid of health services

Professional personnel will no longer deal with minor ailments and injuries but will direct their resources to the more complicated problems and conditions which are beyond the competence of primary health workers. This arrangement should make for more efficient and economical use, not only of personnel, but also of health service facilities (Figure 6.4). Nevertheless, a full understanding and appreciation of the primary health care approach is required by all members of the health team, if it is to succeed. Just as the health sector functions best when in harmony with social and economic sectors, so the health team will function well only if there is full participation and cooperation from each member. All categories of health worker—professional and auxiliary—will need to be orientated to the primary health care approach and made to realize that self-reliance of the community does not reduce the status and responsibility of health professionals—it enhances them.

New functions and roles inevitably have implications for training

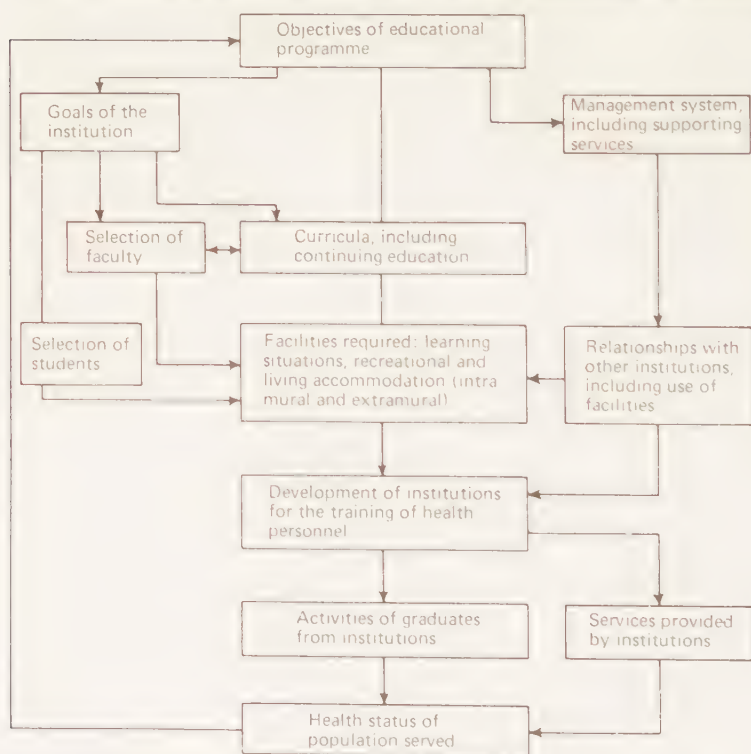


Figure 6.5 The development of educational institutions/programmes in relation to the health status of the people

programmes and curricula content (*Figure 6.5*). The basic training of health personnel will need to be reviewed and adapted where necessary. Field nurses, for instance, will need to develop teaching and supervisory skills. Because of their extensive and intimate contact with patients and families, nurses usually have the confidence of the community and are, therefore, in a strategic position to put scientific information into simple language which patients, families—and new primary health workers—can understand, accept and practise.

Some nurses will need to develop other skills and will require further education in order to perform competently at a new level of the health system. They will need to learn to make a community diagnosis, to make accurate observations of those physical and emotional conditions which have a significant bearing upon health problems, and to communicate their observations to appropriate colleagues or relevant agencies. With other members of the team, they will learn to participate in analyzing health needs, determining services required and planning the construction of facilities and equipment to carry out those agreed services effectively. At the individual level, they will be involved in making a nursing diagnosis, in making an evaluation of the nursing needs of a patient and in assigning appropriate personnel to meet those needs, in accordance with the wishes and cooperation of that individual and his family and taking into account all relevant circumstances.

None of these functions will detract in any way from the traditional role of a nurse. As in Miss Nightingale's day, it is still the essential responsibility of a nurse to promote health and to give skilled nursing care to the sick and disabled in accordance with the physical, emotional and spiritual needs of the patient. This is unchanged. But today the patient may be in hospital, home, industry, school, or seen at the primary health care level. Perhaps we have come full circle to that village mother with her fevered child.

The influence of politics and social policy on the future of nursing education and service

Two of the greatest influences on British nursing during the next few years will be the *Nurses', Midwives' and Health Visitors' Act* of 1979 and the Directives of the Council of the European Communities. There may well be implications for other countries as well. It is to be hoped that, with changes in basic nursing education and the focus on modular clinical education, the expert nurse clinician will eventually be assigned the recognition and stature which has been her due for many years.

The signing of the EEC Nursing Directives in 1977 represented more than a decade of work and preparation. Almost two and a half years of intergovernmental negotiations were necessary before the Council of Ministers approved and signed the papers which dealt with the activities of nurses responsible for general care. To concur with Article 57 of the *Treaty of Rome* (1957), which requires free movement of labour throughout member countries, the directives are concerned with the mutual recognition of diplomas and the coordination of all provisions in respect of nurses responsible for general care. Article 15 places a duty on member states to see that incoming nurses acquire the necessary linguistic ability to practise their profession. This is, of course, in their own interests as well as in those of their patients. The second directive lays down requirements for the training programme—there is no common training throughout the EEC but acceptable minimum standards have been agreed.

The Royal College of Nursing (RCN) established a working group in 1970, and its representatives worked with the British Medical Association when it set up a Forum of Health Professions one year later. The RCN also established an EEC Committee as a Standing Committee of Council in 1972. The following year, the General Nursing Council in England and Wales set up an EEC Working Party, and the Permanent Committee submitted its Memorandum to the EEC Commission and Council, recommending an increase in total training time to 4600 hours.

In 1977, the EEC Council decided to establish an Advisory Committee on Training in Nursing and to extend the remit of the senior officials in public health to cover nurses. It remains to be seen what this great and influential step in nursing will bring. British nurses, although still maintaining pride in the inspiration and work of Florence Nightingale, as Europeans must now take more than just an historical interest in such famous nursing names as Agnes Karl, Henny Ischering and Leonie Chaptal, as well as those of a more recent time such as Marie Bihet, Marina Carvana, Ruth Elster and Alice Clamagaran (Quinn, 1978).

As developing countries strengthen their independencies, establish new training schools and set up their own syllabuses and curricula, long term expatriates will be less often needed, but short-term advisors for 'one-off' events such as seminars, workshops or the setting-up of research units will be increasingly required. This has the great advantages that more nurses will know the privilege and pleasure of undertaking work with overseas colleagues in their own countries, even though the periods of such invaluable experience may be shorter than in the past.

One of the main attractions in nursing is the wide range of opportunities it offers. Never have they been more numerous. Rola Pratt, formerly Chief Nursing Officer to the Federal Ministry of Health, Nigeria, writing about new horizons for nursing, quotes '... new occasions teach new duties and time makes ancient good uncouth' (Pratt, 1970). It is a country's politics and social policy which provide, for nurses, many of those new occasions – for upon these sciences the development of all others largely depends.

The world wide economic recession, having a most profound effect on the future of both education and service, will produce more push-and-pull factors, influencing, among other things, the migration of health personnel (Mejia, Pizuki and Royston, 1979). Specific 'cash limits' on health and social services are being imposed by the British Government. Another important factor is the proposed second reorganization of the National Health Service itself, with elimination of Area Health Authorities, as proposed in the consultative document *Patients First* (HMSO, 1979). It looks as though those turbulent seventies were only heralding the explosive eighties!

Nurses have a potential for powerful influence of social policies at national and international levels. However, this potential will become a dynamic force for action and social change only if and when nurses of the world foster and develop 'political consciousness'. For, as Schröck (1977) has argued in her essay 'On Political Consciousness in Nurses', '... even if all available evidence does not confirm the beliefs of many nurses in the non-political nature of their professional activities, such strongly held mistaken belief must mitigate against the vital realization that health care without politics is simply not possible'.

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The physical sciences in nursing

JENNIFER R. P. BOORE

The physical sciences cover a wide area of knowledge, including astronomy and geology, but the main subjects considered here are physics and chemistry, which have many applications in nursing.

Definitions

The *Oxford English Dictionary* defines physics in two ways. The earlier usage of the word denoted natural science in general. However, it is now ‘. . . restricted to the science, or group of sciences, treating of the properties of matter and energy or of the action of the different forms of energy on matter in general (excluding Chemistry . . . and Biology).’ Chemistry, on the other hand, is defined, also by the *Oxford English Dictionary*, rather more specifically as ‘. . . that branch of physical science and research which deals with the several elementary substances, or forms of matter, of which all bodies are composed, the laws that regulate the combination of these elements in the formation of compound bodies and the various phenomena that accompany their exposure to diverse physical conditions’.

These definitions make it clear that these two subjects can be seen as distinct entities. However, this is a comparatively recent development. Physics became clearly differentiated from chemistry only in the late eighteenth and early nineteenth centuries. Similarly, while living and non-living phenomena were recognizably different, those interested in natural science (physics in the older sense of the word) studied both the physical and biological sciences. The specialist physicist, chemist or biologist appeared quite recently. During this century these subjects have again come closer together as much of the structure and function of living things is now understood in terms of physical and chemical properties.

Value to nursing

The physical sciences are of direct value in nursing through their contribution to the understanding of bodily function in health and

disease, and to the comprehension of techniques and equipment used. In this chapter some examples of these applications, concentrating mainly on the understanding of bodily function, will be discussed. However, equally (if not more) important are the methods of study developed in scientific inquiry. It can be argued that the scientific method has been the greatest contribution of the physical sciences to nursing, providing the necessary approach for researchers to examine nursing in detail, endeavouring to elucidate and explain relationships.

In the early stages of Greek civilization, science was associated with technology in the development of techniques to increase man's comfort and control over his environment. Later, when slavery became prevalent, manual pursuits were often considered to be 'beneath' the educated citizen. During this period the natural philosophers developed theories about the universe and the nature of matter, but did not usually test these in practice. However, Strato in the third century BC devised experiments to test his ideas about the physical properties of matter.

Experimentation was developed further following the Renaissance. Francis Bacon in 1620 described how he sought all available facts through experimentation, organized the results systematically, and used the relationships found to derive a general law. This method is known as induction, when one moves from the particular to the general, and has been used in much research in nursing, although systematic observation, rather than experimentation, has been more commonly used to obtain the facts. The converse method of deductive reasoning is where one moves from the general law to the particular instance.

The scientific approach developed over a long period and is essentially a logical sequence of thought and observation. When using the scientific method, the area of work is surveyed in order to gain a general understanding of the knowledge available. A specific problem is identified, or question asked, and the literature is then again examined in order to discover previous work on this topic. The theoretical background acquired allows some prediction of the relationships which may be found. Hypotheses, or statements about the possible results, are formulated in the light of previous knowledge. These hypotheses are then tested under relatively controlled conditions. Measurements and observations are made, before and after intervention, and the results obtained are analyzed in terms of previously identified criteria and interpreted in the light of the theoretical framework used. The scientific method is the same logical approach to problems that is used in the nursing process, discussed elsewhere in this book.

In studying various topics scientists have used models—representations of the relationships between various facts and phenomena. The model is then tested by experiment. The use of models has only fairly recently been introduced in nursing, but a number are discussed by Riehl and Roy (1974). A model may be arrived at inductively by developing concepts from situations in practical nursing. However, some nursing theorists have used the deductive approach, modifying concepts from other disciplines and linking them together to aid in the understanding of nursing. A model of nursing may be found to describe relationships accurately between the different components when it is tested experimentally in various situations and under varying conditions. It then becomes of value in predicting the effects of different nursing activities and can be used to guide the nurse practitioner in her assessment and planning of patient care.

Control systems

Technology or 'the practice of the applied sciences that have practical value and/or industrial use' (*Chambers Twentieth Century Dictionary*) is based mainly on the physical sciences and is important in nursing through its role in the development of equipment and techniques. However, in addition, the consideration of certain systems used in technology can clarify some areas of human function.

Cybernetics has been described as 'the science of robots' (Rose, 1969), but is much more than this. It is concerned with 'the communication and manipulation of information and its use in controlling the behaviour of biological, physical and chemical systems' (Porter, 1969). Thus, cybernetic models and concepts, such as feedback, can aid the understanding of control systems, both in physiology and technology.

Control systems commonly aim to maintain the variable under consideration at a constant level, or at least within prescribed limits. They involve the use of negative feedback which aims to minimize variation. Any control system (*Figure 7.1*) consists of (in the simplest terms) a sensor (A) which is sensitive to the variable being regulated and which sends information to the control centre (B), which sends a command signal to an output unit (C). The sensor adjusts its output (the information sent to the control centre) according to the level of the variable being measured. The command signal from the control centre varies according to the input from the sensor, and this signal adjusts the activity of the output unit. The response from the output

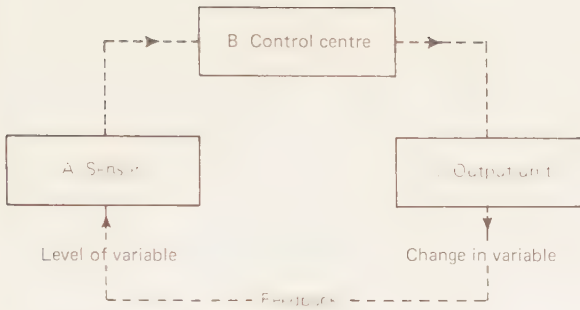


Figure 7.1 Control system

unit will adjust the level of the variable and this level then acts as the stimulus to the sensor. Where a rise in the variable measured (due to output unit activity) reduces the input to the control centre (from the sensor), or where a fall in the variable leads to an increase in input, this is known as negative feedback. There is normally some slight oscillation in the level of the variable, but this type of system leads to a considerable degree of stability. *Figure 7.2* shows the type of oscillation that occurs with a negative feedback system for control of water temperature.

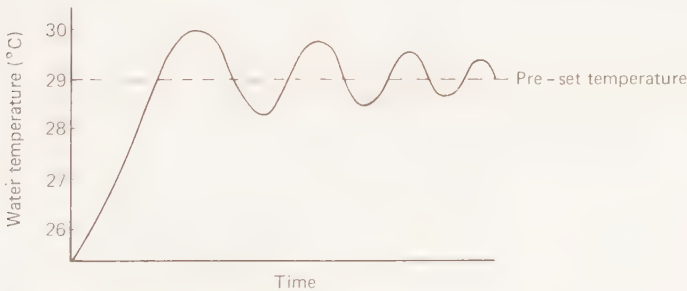


Figure 7.2 Oscillation with negative feedback

Positive feedback occurs when the original increase in output leads to an increase in input to the control centre and the disturbance increases still further. Such systems are unstable and are relatively uncommon. However, blood clotting is one important example of positive feedback in the body. The initial change—attributable either to intrinsic or to extrinsic factors—leads to a cascade of changes in the blood, culminating in the conversion of fibrinogen to fibrin and formation of a blood clot.

The understanding of the principles of control systems is an aid to

the comprehension of human physiology, although the components are named differently and may not all be present in an easily identified form. The general components of a biological control system are shown in *Figure 7.3*.

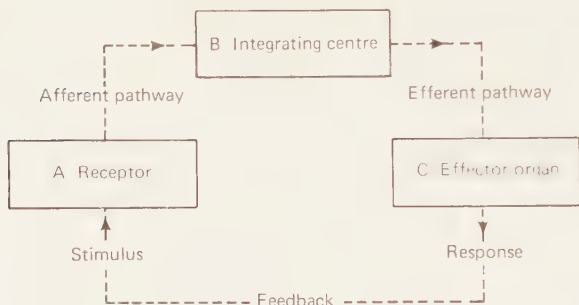


Figure 7.3 Biological control system

Control of conscious activity can be viewed in this way (*Figure 7.4*) and most individual variables are controlled through negative feedback. Respiration, blood pressure, fluid and electrolyte balance, body temperature are only a few examples of physiological levels regulated through such a system.

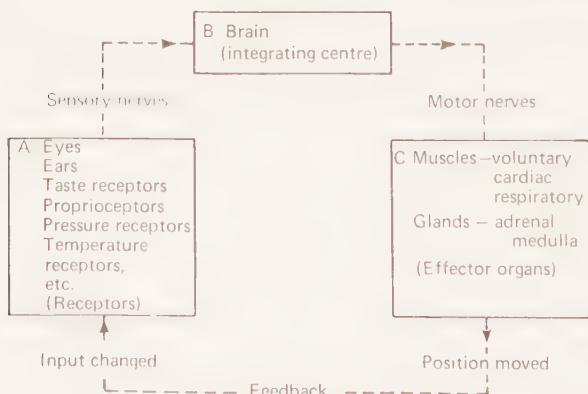


Figure 7.4 Control of conscious activity

Physics in nursing

Physics itself has numerous applications in nursing and *Table 7.1* lists some of the areas which are based on physical principles. Many

Table 7.1 Some activities related to nursing, based on physical principles

<i>Direct patient care</i>	<i>Measurements and investigations</i>	<i>Treatment</i>	<i>Equipment and safety</i>
Pressure area care	Temperature and blood pressure recordings	Radiotherapy	Use of electrical apparatus
Use of flotation bed and other equipment for relief of pressure	Specific gravity of urine	Radioisotopes	Autoclaving for sterilization
Postural drainage and respiratory exercises	Central venous pressure measurements	Haemodialysis	Gamma radiation
Positioning and lifting of patients	Basal metabolic rate	Peritoneal dialysis	Use of materials to reduce static electricity
Administration of oxygen	Monitors: ECG, EEG	Pacemakers	Precautions with anaesthetic gases
Treatment of hypothermia	Respiratory function tests	Underwater drainage	Ventilation
Tepid sponging and use of fans	X-rays	Suction	Raised air pressure and filtration systems to reduce bacterial count
Management of bladder drainage and irrigation	Scans of brain, liver etc., using radioisotopes	Dathermy	Ultraviolet screens
Use of hearing aids and spectacles	Ultrasound scanning	Positive and negative ventilation	
Management of intravenous infusions	Lumbar puncture	Use of traction	
Catheterization	Use of fibroptic gastroscopes etc.	Giving injections	
	Audiometry	Aspiration of body fluids	
	Use of auroscopes and ophthalmoscopes	Application of plaster of Paris	

of these principles are discussed in detail in books about physics for nurses (Kilgour, 1972; Flitter, 1976; Sackheim, 1962; Jenson, 1976). It is obviously impossible and is undesirable to attempt to cover the same ground. Instead, a few examples of physical principles will be discussed in some detail, and applied to the understanding of body function and nursing.

Energy

One of the major concerns of physics is energy which has been described as 'the ability to do work' (Grillot, 1974). Energy exists in many different forms such as heat, electrical, radiant or chemical energy, and these can be converted from one into another. Electrical energy can be changed into heat or used to produce movement in mechanical equipment, but energy cannot be lost. The Law of Conservation of Energy states that energy cannot be created or destroyed, but can be changed from one form to another. The Law of Conservation of Mass similarly states that matter is neither created nor destroyed when a chemical reaction takes place. Both these laws hold true under normal conditions although in the field of nuclear physics they have been superseded by Einstein's famous equation:

$$E = mc^2, \text{ where } E = \text{energy, } m = \text{mass, and } c = \text{speed of light.}$$

This demonstrates the enormous amount of energy incorporated in matter and implies that matter can be changed into energy, and energy into matter, but the total amount of matter and energy in the universe remains constant. However, in the context of human function the two earlier laws are quite adequate.

Chemical energy is involved in the formation and breakdown of molecules, and energy is released during many chemical reactions. When this energy is used to perform work, for example chemical energy in petrol is transformed into mechanical work which moves the car, there is a discrepancy between the chemical energy put into the system and the mechanical work performed. A considerable amount of the chemical energy is transformed into thermal energy, raising the temperature of the system. Efficiency is the ratio of the useful work performed to the work put in as energy. Man can convert up to 25 per cent of the chemical energy in food into mechanical work, a figure that compares well with much modern machinery.

The Second Law of Thermodynamics states that the entropy of the universe moves towards a maximum, and in an isolated system changes occur spontaneously only when they lead to an increase in

entropy. Entropy is a measure of randomness or disorder, and to reverse entropy within a system requires the addition of energy from outside.

The human body is a system and, without the intake of energy, would begin to disintegrate and die as entropy increased. However, it is not an isolated system, but a highly organized one in equilibrium with its surroundings. Energy is taken into the body in the form of chemical energy in food and is used to produce minimum entropy. That is, the body requires energy simply to maintain the state of organization and order, as well as needing additional energy for activity. However, this food is not in a form which can be utilized immediately by body cells. Food is ingested in the form of carbohydrates, fats and proteins and these are broken down through digestion so that the energy present in their chemical structure can be used by the body. Although it is possible to live for some time without food, changes take place in body function and entropy is increased. A regular, adequate supply of nutrients to patients is important, particularly in those who have suffered trauma, or have undergone operation, where additional supplies of energy are required for reorganization of tissues during healing.

Glucose is the major energy source within the body, although amino acids and fatty acids are also used. The energy is required for three purposes; to perform mechanical work; to maintain the tissues of the body; and for growth. When glucose is burnt up completely, the energy liberated per gram of glucose is 15.5 kJ (kilojoules*).



1 g glucose

oxygen

carbon dioxide

water

energy

The other nutrients release different amounts of energy per gram; protein produces approximately 22.5 kJ/g and fat about 38.5 kJ/g. However, in all cases the amount of oxygen used is in direct relationship to the energy liberated. This knowledge is used in the measurement of the basal metabolic rate when the energy used at rest is assessed by measuring oxygen uptake.

If all the energy within the nutrients was released simultaneously, most of it would be lost in the form of heat and little could be used for body metabolism. Instead, the energy within the glucose molecule is released in stages as the glucose is broken down into smaller molecules and eventually to carbon dioxide and water. The energy is transferred through the movement of hydrogen ions and electrons to form high-energy molecules called adenosine triphosphate (ATP). The energy stored within these molecules is

*1 joule = energy expended when 1 kilogram is moved 1 metre by a force of 1 newton

used as needed by the cell and can be released in small amounts for particular chemical reactions to occur.

The breakdown of glucose takes place in two stages (*Figure 7.5*). The first stage, glycolysis, involves the breakdown of glucose (a molecule containing six carbon atoms) to pyruvate (a three-carbon molecule); this stage does not require oxygen, and takes place in the cytoplasm of the cell. Initially, for the breakdown of one molecule of glucose, energy must be supplied by its release from two molecules of ATP as they are converted to adenosine diphosphate (ADP). Later, energy is produced and 10 molecules of ATP are formed, storing the energy in chemical form until required. If oxygen is not present (as in muscle during exercise), pyruvate is converted to lactate, in the

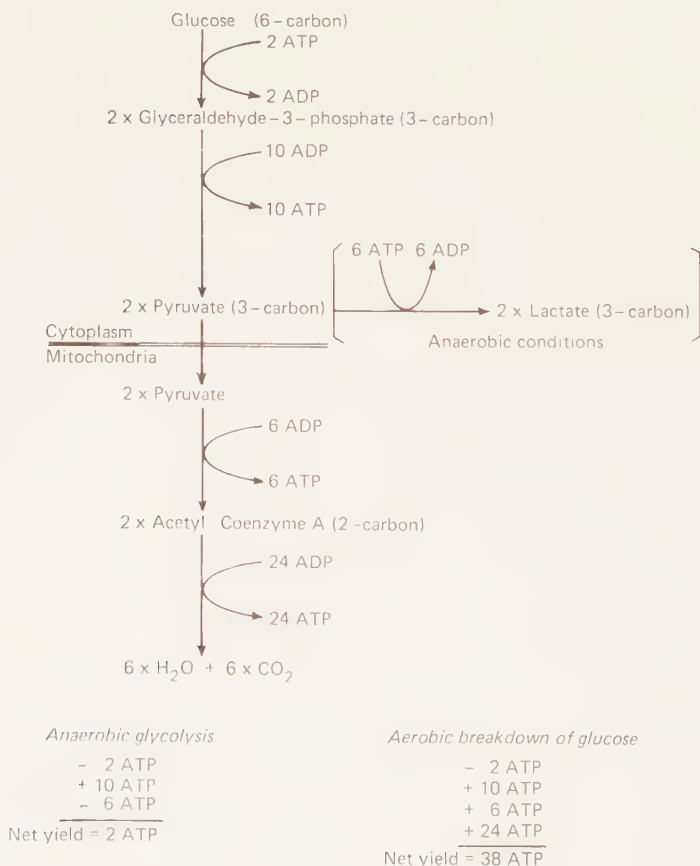


Figure 7.5 Transfer of energy from glucose to ATP

course of which reaction the energy from six molecules of ATP is used for every two molecules of pyruvate used (from one glucose molecule). Thus the total energy produced under anaerobic conditions is stored in two molecules of ATP.

However, in aerobic conditions pyruvate enters the mitochondria of the cell (where the majority of energy-producing reactions occur), is converted to acetyl-coenzyme A (a two-carbon molecule) and enters the citric acid cycle where it is completely broken down to carbon dioxide and water. The energy produced from two pyruvate molecules is used in the formation of 30 ATP molecules. Thus, the energy produced and stored under aerobic conditions from one molecule of glucose is 38 ATP, compared with 2 ATP under anaerobic conditions. Because patients with disorders of the respiratory or cardiovascular systems may not be supplying the tissues with enough oxygen for aerobic metabolism of glucose to occur properly, much less energy will be available for maintenance of tissues and activity.

The efficiency of a system is the ratio between the amount of energy entering and that of the energy effectively used. One millimole* of glucose, when completely oxidized, releases 2870 J. In the process, 38 millimoles of ATP are formed; each millimole of ATP can release 30.5 J. Thus, the efficiency of the conversion of glucose to ATP is $(38 \times 30.5)/2870$

or approximately 40 per cent. About 60 per cent of the energy in the glucose is dissipated as heat.

Work

Much of the energy used in the body is employed to reverse entropy, i.e. to prevent the disorganization of body tissues and promote healing, or to increase organization of the body in growth. The energy used for these processes is assessed by the basal metabolic rate mentioned earlier. In addition, energy is required so that work can be carried out.

Work is defined in physical terms as the product of the force applied and the distance moved, and obviously moving one's own body, or moving objects, is work and requires energy. People involved in hard manual labour may require more than twice as much energy intake in a day as someone with a sedentary job.

*A mole is the molecular weight in grams of a substance; a millimole is one-thousandth of a mole. The molecular weight of glucose = 180; therefore 1 mole of glucose = 180 g; 1 millimole = 0.18 g.

However, in carrying out actions such as pushing against a brick wall (or pushing a car) very little work, in the physical sense, is carried out, although the person concerned may feel that a lot of energy has been used. This can be understood if the movement of the individual muscle fibres is considered. In isometric exercises, similar in principle to pushing against a brick wall, the various muscles are contracted and relaxed, while keeping the exercised part of the body still. However, the individual muscle fibres are contracting in turn—the actin and myosin strands within the muscle are sliding over each other and shortening the muscle fibre. Thus, work is being carried out and energy, stored in ATP, is being used. Such muscular activity also produces a considerable amount of thermal energy.

Heat

It has already been stated that mass energy is constant, although energy can be converted from one form into another. Thermal energy is one form of energy which is produced when work is done and will cause an increase in temperature of the material concerned. As the temperature rises, the movement of molecules increases, and vice versa. Absolute zero (-273°C) is theoretically the coldest condition which can exist and at this point all molecular movement will have ceased. The Second Law of Thermodynamics deals with the flow of heat from a hotter to a colder object; the higher rate of movement of molecules in the first object will increase the mobility of molecules in the cooler object in contact with it, as energy is transferred from one to the other. The greater the difference in temperature between the body and its surroundings, the more thermal energy will be transferred. In vasodilation the greater amount of blood reaching the surface of the body raises the skin temperature and increases heat loss.

Some substances can transmit heat more readily than others—they have a high thermal conductivity; metals are examples of such substances. Materials of low thermal conductivity are used as insulators to reduce heat flow, as in clothing. Thermal energy applied to a substance will lead to an increase in temperature, although the amount of heat which needs to be applied to raise the temperature of a specific amount of a substance by a set number of degrees (the specific heat), varies. Water and blood (having a high specific heat) need the application of considerably more heat than do metals in order to achieve the same rise in temperature. Water will also release more heat in cooling and is therefore used in heating systems.

An increase in thermal energy content and the accompanying

increased movement of the constituent molecules, causes expansion of the substance, whether solid, liquid or gaseous. This increase in mobility can also cause some substances to change their state from solid to liquid, or liquid to gas. Different substances require different amounts of heat for these changes. The transformation of 1 g of ice to water at 0°C (i.e. without any change in temperature) requires approximately 336 J, the heat of fusion of ice. The heat of vaporization of water, i.e. the heat required to convert 1 g of water at 100°C to water vapour, is approximately 2268 J—a large amount of heat.

Within the human body, heat is continually being produced, both by muscular activity and through the metabolic activity within the cells. If this heat cannot be dissipated, body temperature rises and increased movement of the molecules within the cells will cause disruption of protein molecules, leading to death. It can be estimated that a man weighing 65 kg, ingesting the recommended intake of 12.5 MJ of energy in the diet, would show a rise in body temperature of about 1.8°C hour. This would rapidly be fatal if the heat were not dissipated.

Thermal energy is lost from the body in several ways. Radiation differs from the other mechanisms in that it does not involve an effect on adjacent molecules, but can cross a vacuum, where there are no molecules, and can heat substances at a distance, in the way that the sun's heat reaches the earth through the vacuum of space. Approximately 60 per cent of body heat is lost through radiation. Radiant energy is reflected by shiny or white surfaces, and absorbed by black or dark materials. This knowledge is applied in the use of foil or 'space' blankets to reduce heat loss and to reflect it back to the patient, in premature babies or cases of hypothermia.

Conduction and convection are two other methods by which heat is dissipated from the body. In conduction, molecules in contact with the body are warmed and the body is cooled, as thermal energy is transferred. Convection simply increases the effect of conduction as the air surrounding the body is warmed and rises, being replaced by cool air, allowing more heat to be lost. This mechanism is used when fans increase heat loss from a pyrexial patient. Loss of heat by conduction and convection is reduced by the wearing of clothes, several layers of thin clothing being more effective than fewer layers of heavy clothing. Air is a relatively poor conductor of heat, and the still layers of air trapped in the clothing reduce conduction and convection of heat. These two methods of heat loss from the body are usually relatively unimportant.

The final method by which heat is lost from the body is by the evaporation of sweat from the skin. As the latent heat of

vaporization of water is about 2268 J, a moderate amount of heat is removed from the body in this way. Obviously, as the amount of sweat produced varies, depending both on the external temperature and on the heat which needs to be lost from the body, this is an important mechanism for adapting to different conditions. In tepid sponging procedures, the skin is left damp in order that heat from the body may be used to evaporate the moisture from the skin, thus lowering body temperature.

Chemistry

In comparison with the numerous applications of physics shown in *Table 7.1*, there are relatively few examples of the application of chemistry to nursing. The use of various lotions, urine testing, and the administration of drugs or intravenous fluids may be cited. However, as far as nurses are concerned, the most important area of application of chemistry is in the field of biochemistry but this area also involves certain principles derived from physics. The discussion of energy utilization within the human body (*see* pages



Figure 7.6 Diagrammatic representation of cell structure

92-95) is an example of the interrelationship between physics and chemistry in the understanding of human function. Biochemistry is simply the chemistry of living things: increased knowledge about the chemical processes occurring within the cells and tissues of the body has greatly improved our understanding of normal bodily function and of the changes which occur in disease. Most, if not all, illness is associated with some change in biochemistry.

Cell function

The cells of the body are dynamic structures existing within the 'internal sea', the extracellular fluid or internal environment of the body described by Claude Bernard in the nineteenth century. Each cell is a discrete functional unit, but all cells are regulated and coordinated to create a coherent organism. Cell structure is complex, each cell consisting of a number of structures, formed from cell membranes, within the matrix or cytoplasm of the cell, all within the outer cell membrane (*Figure 7.6*).

Within each cell there is a continual movement in the direction of increased entropy as the structural components of the cell are broken down, enzymes become denatured and inactive, ATP is converted to ADP and energy liberated as heat. However, at the same time the energy in the nutrients constantly supplied to the cell is being used to reverse this trend. ATP is re-formed and used in the construction of replacement structural and functional cell components. A greatly simplified representation of the dynamic function of the cell is shown in *Figure 7.7*. In this Figure the arrows indicate the direction

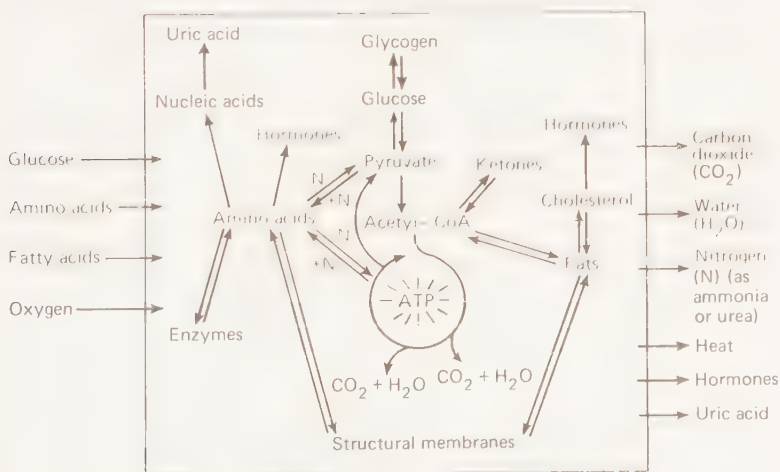


Figure 7.7 Simplified diagram of dynamic function of the cell

of the chemical pathways resulting in the particular end products indicated. Most of these pathways consist of a number of chemical reactions, some of which are reversible, in that they can go in either direction. Other steps, however, are irreversible and, in these cases, the forward and backward pathways involve different reactions.

Chemical reactions

The atomic structure of the substances involved, and certain general principles, determine the way in which chemical reactions occur. Most of the substances involved in cell metabolism—the amino acids, glucose derivatives and fats—are all based on carbon. The atomic structure of carbon (*Figure 7.8*) comprises six protons (each

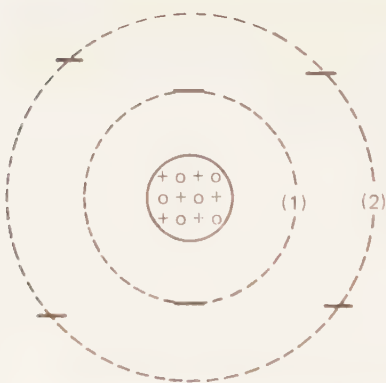


Figure 7.8 Diagrammatic representation of the atomic structure of carbon (not to scale). Atomic weight = 12 (6 protons, +; 6 neutrons, o; 6 electrons, —). (1) represents the first, and (2) the second, shell of electrons

with one positive charge) and six neutrons (neutral charge), all of which are in the nucleus. Six electrons spin around the nucleus at varying distances and orientations. Four of these electrons are in the outside shell, furthest away from the nucleus. A relatively stable structure is formed when there are eight electrons in the outside shell (as in the rare gases): in chemical combination, electrons can be shared between atoms, or can be transferred from one to another to achieve this state.

Covalent bonding, which occurs with carbon, is when electrons are shared between atoms (*Figure 7.9*) and results in relatively stable structures, allowing the development of life. Many of the molecules involved in biochemistry have carbon skeletons (*Figure 7.10*) with other elements attached, particularly hydrogen and oxygen. Proteins also contain nitrogen, and sometimes phosphorus and sulphur. All these substances combine according to their valency, determined by the number of electrons in the outside shell.

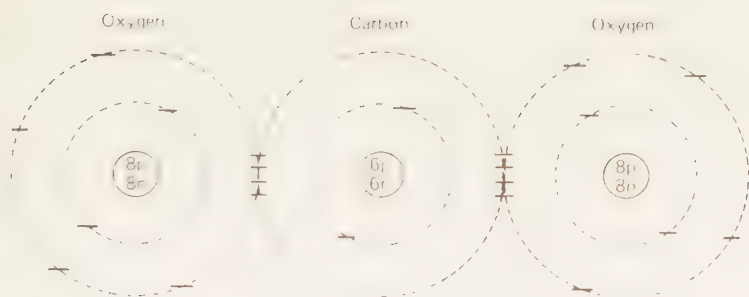


Figure 7.9 Covalent bonding — carbon dioxide (CO₂). Each oxygen atom has an atomic weight of 16 and contains 8 protons, 8 neutrons and 8 electrons; it shares 1 pair of electrons with the carbon atom. The carbon atom has an atomic weight of 12 and contains 6 protons, 6 neutrons and 6 electrons. It shares 2 pairs of electrons, 1 pair with each oxygen atom, as shown

The number of electrons which can be transferred bodily (either donated or accepted) is limited, commonly one or two electrons only being involved, although occasionally three can be transferred. This movement of electrons will leave the atom (or molecule) either positively charged (if an electron has been donated) or negatively charged (if an electron has been gained). Substances which, in water, dissociate into positively and negatively charged particles (or ions) are known as ionic substances. A positively charged particle is known as a cation and the negative particle as an anion. They are also known as electrolytes. Positive and negative charges are attracted to each other and result in ionic bonding (*Figure 7.11*).

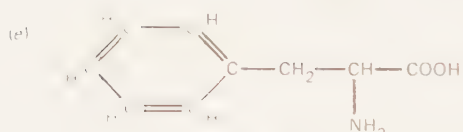
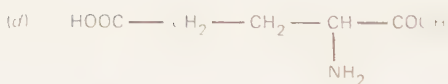
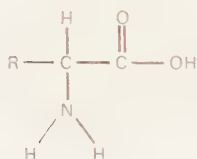
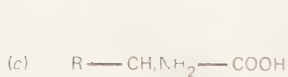
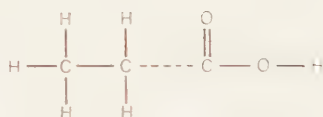
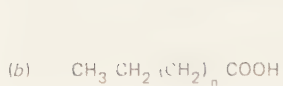
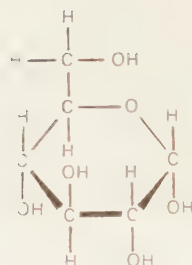
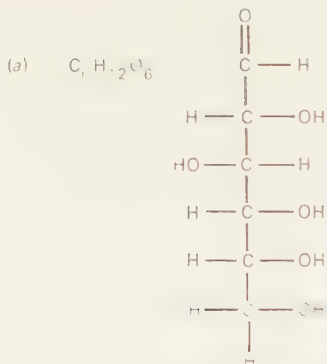
Chemical reactions, when changes take place in the organization and chemical make up of molecules, naturally conform to the Law of the Conservation of Matter. Many chemical reactions are reversible and, therefore, will reach a state of equilibrium when the reactions in both directions take place at the same rate. Le Chatelier's Principle states that a system in equilibrium reacts to an applied stress in such a way as to reduce the effect of that stress. For example, in the reaction



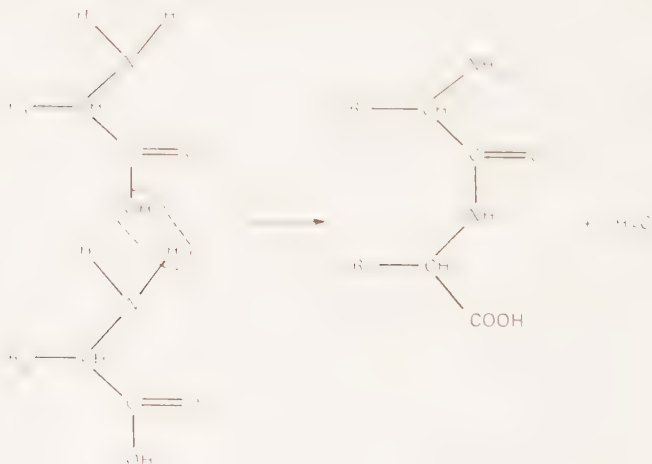
where A and B are combining to form AB at the same rate as that at which AB is dissociating to form A and B, the addition of more A will drive the reaction towards AB:



until a different state of equilibrium is achieved. Removal of AB would have a similar effect:



(f)



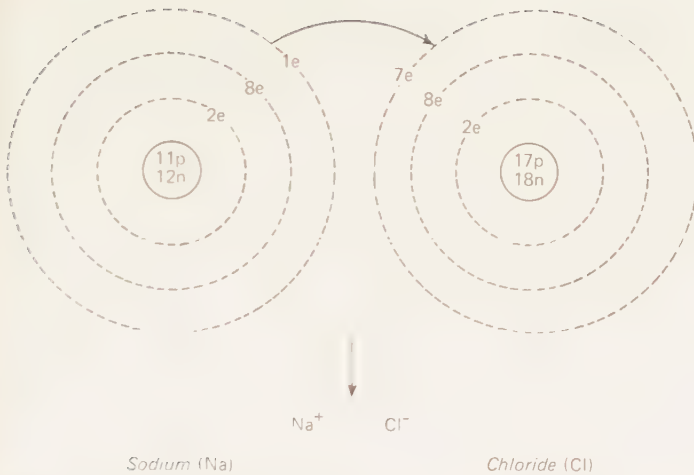


Figure 7.11 Ionic bonding — sodium chloride (NaCl). The sodium ion donates one electron and is therefore left with one positive charge from the unbalanced proton. The chloride ion receives one electron and is therefore left with one unbalanced negative charge



Removal of A or B would increase the reverse reaction



Changes in temperature or pressure may also alter the state of equilibrium, depending on whether the reactions involve the release or absorption of energy. The rate of chemical reactions is increased by a rise in temperature, thus explaining the increase in metabolic rate and in use of oxygen by the tissues when a patient is pyrexial. The increased pulse and respiratory rate are physiological adaptations to supply more oxygen to body cells.

Some chemical reactions occur very slowly without the presence of a catalyst. A catalyst is a substance which affects the rate of a chemical reaction, without itself undergoing chemical change. In

Figure 7.10 Some physiologically important carbon-based molecules. C = carbon, valency 4; H = hydrogen, valency 1; O = oxygen, valency 2; N = nitrogen, valency 3. The molecules can be represented in various ways, as shown for (a) glucose; (b) fatty acids; (c) amino acids, for which a common structural formula is shown, R representing a variable side chain. The human body contains 20 different amino acids, such as (d) glutamic acid. Phenylalanine (e) however, is an essential amino acid which cannot be formed in the body and must therefore be supplied in the diet. (f) shows how the peptide link joins amino acids to form, ultimately, a protein chain

many instances a certain amount of activation energy is required to start the reaction. The catalyst forms an intermediate product requiring less activation energy, thus enabling the reaction to occur more readily (*Figure 7.12*). The catalyst is then regenerated.

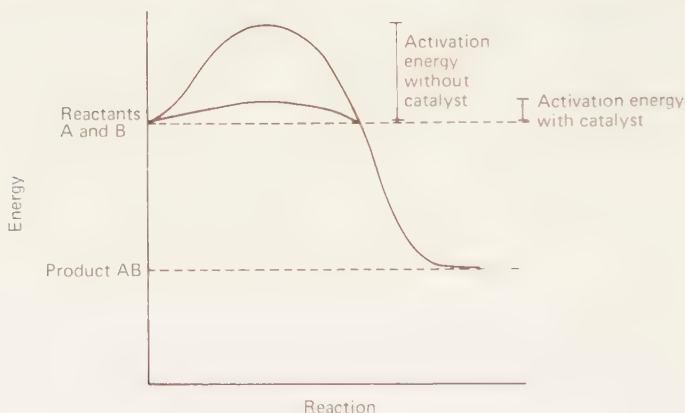


Figure 7.12 Activation energy

Control of cell metabolism

Within the cell, enormous numbers of chemical reactions occur in the catabolism and synthesis of complex molecules. These reactions must be regulated to allow the whole cell to function harmoniously, and several different mechanisms are involved.

The cell membrane itself performs an active role by maintaining the different composition of the intracellular and extracellular fluids through its selective permeability. Nutrients enter in various ways, some of which (e.g. active transport*) are adjustable. Some hormones alter the permeability of the cell membrane, as in the case of insulin which promotes entry into the cell of glucose, amino acids and potassium.

Many of the chemical reactions occur at an effective rate only in the presence of enzymes, or organic catalysts. The enzymes for different chemical pathways tend to be localized in different parts of the cell and the selective permeability of the membranes of the subcellular organelles allow the product of one pathway to feed into another, while keeping pathways separate (*see Figure 7.5—glycolysis*

*Active transport is when a substance is transferred by a carrier molecule across a membrane from an area of low concentration to an area of high concentration. It requires the use of energy from ATP.

occurs in the cytoplasm; the citric acid cycle is in the mitochondria).

Alterations in the level of activity of enzymes allows the cell to adjust to changes in supply and demand. Activation or inhibition of activity of an enzyme facilitating an irreversible reaction will control the rate of the whole pathway. Enzymes are protein molecules, formed within the nucleus of the cell from the genetic instructions carried in the deoxyribonucleic acid (DNA) of the chromosomes. Like other proteins, enzymes are degraded into amino acids and must be replaced regularly. Alteration of the rate of formation of enzymes in the nucleus allows adaptation to occur. Certain hormones, for example corticosteroids, function in this way; their action develops quite slowly and lasts a relatively long time.

Feedback inhibition is the major route by which cell activity is regulated. In some instances the end product of a pathway inhibits the formation, within the cell nucleus, of a key enzyme in the pathway. More commonly, however, the activity of the already formed enzyme is adjusted, allowing fine control of metabolism. Enzymes appear to function by physically bringing together the reacting molecules at the active site of the enzyme. The active site is formed by the configuration of the protein molecule, which is

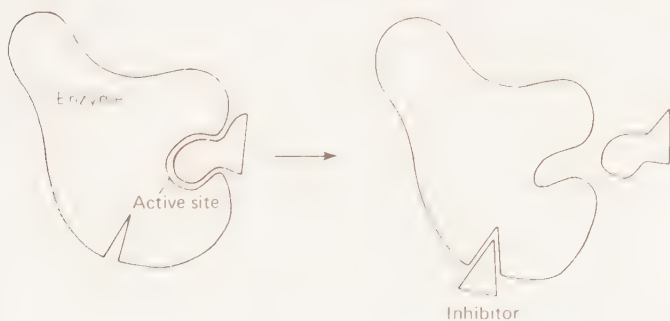


Figure 7.13 A change brought about in the active site of an enzyme by the presence of an inhibitor. On the left, the substrate is shown fitting into the active site; in the diagram on the right, the active site has been deformed by the presence of the inhibitor, which may be the endproduct of a metabolic pathway

determined by the number and order of the individual amino acids with their varying side chains. Even a single amino acid substitution in the active-site area can result in an inactive enzyme, leading to accumulation of a particular substance in the cell and, eventually, to cell damage and possible death (for example, Tay Sachs disease and glycogen storage diseases are attributable to a missing or inactive enzyme). The shape of the active site may be altered by the end

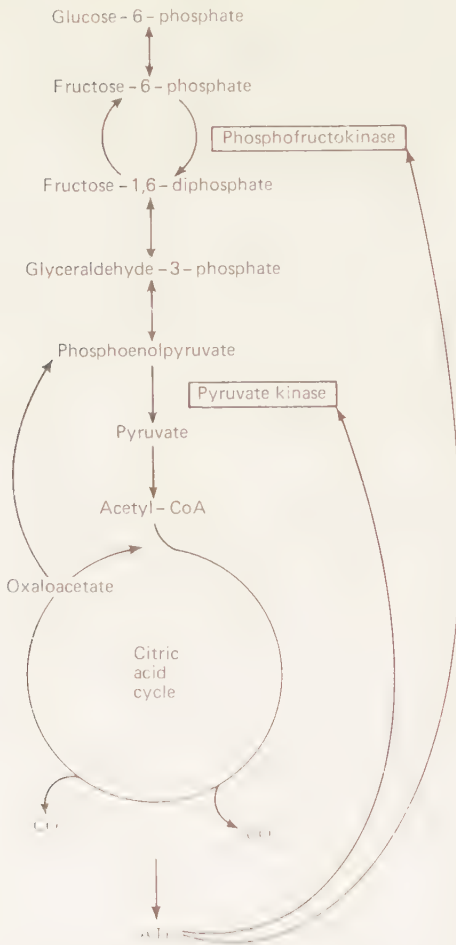


Figure 7.14 Feedback control in glucose metabolism. Phosphofructokinase and pyruvate kinase are both enzymes which allow irreversible reactions to occur. Both are inhibited by ATP. Thus, excess ATP reduces the production of further ATP by inhibition of the glycolytic pathway

product of the pathway (*Figure 7.13*), resulting in negative feedback (*Figure 7.14*), which maintains production at a constant rate.

Changes in the chemical or physical properties of the internal environment can alter the protein structure, destroying or reducing enzyme activity. The danger of heat stroke lies in the permanent denaturation of enzymes (*Figure 7.15*).



Figure 7.15 Denaturation of enzyme

Acid-base balance

Reversible changes in enzyme activity occur with an alteration in pH*. Normal tissue pH is about 7.4, slightly alkaline, and a marked change from this can considerably alter the ionization of the side chains of some of the amino acids forming the enzyme (*Figure 7.16*), and thus change the configuration of the active site. Thus it is essential that the pH of tissue fluid remains within narrow limits. Cell metabolism is continually forming carbon dioxide which, with water, forms carbonic acid, which partly ionizes to hydrogen ions and bicarbonate ions:



In addition, the formation of lactate, ketones and other substances all contributes to the hydrogen ion load of the body. However, the pH of venous blood, removing waste products from the cells, falls only to about 7.36.

The rapid mechanism which minimizes the fall in pH is the buffering ability of the blood. A buffer system is often formed by a weak acid (partly dissociated into ions) and a salt of that acid (completely ionized) and is able to absorb or release hydrogen ions as necessary to minimize any change in pH. Within the human body, haemoglobin and other blood proteins are important buffers, as the amino acid constituents are able to absorb and release hydrogen ions (see *Figure 7.16*). However, another major buffer system is the carbonic acid-bicarbonate system.



*pH is the negative log of the hydrogen ion concentration. It is the measure of acidity or alkalinity in a solution. pH 7 = neutral; less than 7 = acid, more than 7 = alkaline.

†The conversion between carbon dioxide and water, and carbonic acid occurs in the presence of an enzyme, carbonic anhydrase, within the red blood cells.

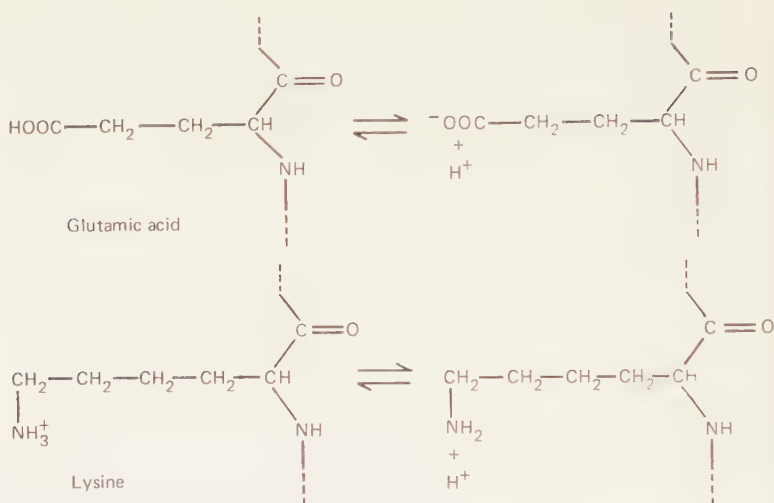


Figure 7.16 Ionization of amino acid side chains (remainder of protein omitted)

Referring back to the discussion of Le Chatelier's Principle, it is clear that the addition of hydrogen ions will lead to the formation of additional carbonic acid, while the large amounts of bicarbonate from the salts will still be present. When fewer hydrogen ions are present, the carbonic acid will dissociate to maintain a constant concentration of hydrogen ions (H^+). At a pH of 7.4, the ratio between carbonic acid and bicarbonate is 1:20 and the physiological mechanisms endeavour to maintain this ratio. Lungs excrete carbon dioxide, thus reducing carbonic acid, and the kidneys can excrete hydrogen or bicarbonate ions as necessary. These systems are the slower-acting but final mechanisms for the control of acid-base balance.

Acidosis or alkalosis occur when the pH of the blood alters towards acidity or alkalinity (although the pH probably will still be within 7.0–7.8). Metabolic acidosis occurs when excessive amounts of hydrogen ions are formed, as in diabetic ketoacidosis, while respiratory acidosis develops in severe respiratory disease, when carbon dioxide is retained and hydrogen ions are not removed through formation of carbonic acid. Metabolic alkalosis occurs when there is an increase in plasma bicarbonate, possibly after ingestion of excessive sodium bicarbonate, and respiratory alkalosis is due to excessive expiration of carbon dioxide.

The patient with metabolic acidosis will have deep, rapid respiration: conversely the patient with metabolic alkalosis will have depressed respiration, in an attempt to redress the balance. If the

ratio of carbonic acid to bicarbonate is maintained at 1:20, although the actual amounts in the blood are altered, the condition is said to be compensated.

Hydrogen ions and potassium ions are excreted through the same mechanisms in the kidney. Thus alkalosis, when fewer hydrogen ions are available for excretion, will lead to a loss of potassium ions instead, resulting in hypokalaemia.

The constant state of the internal environment is essential for normal cell function. Acid-base balance has been discussed here a little, but fluid and electrolyte balance are equally important. Correct distribution of electrolytes (particularly sodium and potassium) across cell membranes is essential for normal cell function, particularly nerve and muscle function. Disorders in these areas are discussed in detail elsewhere (Metheny and Snively, 1974; *Nursing* 1980) and unless managed correctly can lead to death.

In this chapter only a few aspects of physics and chemistry have been discussed, mainly in relation to cell and body function. However, textbooks are available which examine, in detail, physics and chemistry relevant to nurses (Biddle and Floutz, 1963; Kilgour 1969; Kilgour, 1972; Flitter, 1976). These should be consulted, because both subjects can contribute greatly to our understanding of patients' bodily function, and thus can assist in our assessment and planning of care.

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The science of microbiology and the art of nursing

MURIEL SKEET

For Art and Science cannot exist but in minutely organised Particulars. William Blake.

Although descriptions of infectious disease appear in the Bible and in the literature of many subsequent centuries, it was not until the mid-nineteenth century that the science of microbiology got under way.

Primitive man had attributed disease to 'divine wrath,' manifested either in the individual or a whole community. Over the years, some rule-of-thumb knowledge developed and certain skills were acquired to deal with disease. These included procedures for prevention and substances for cure. The most remarkable examples, perhaps, were variolation or inoculation against smallpox—practised in China hundreds of years before Jenner announced his great discovery to the incredulous world—and the use of mould preparations in the treatment of wounds—practised among primitive peoples in Africa, Asia and Latin America. Some of the latter are still very effective and the World Health Organization, having eradicated smallpox from the globe, is now encouraging governments of its member states to develop health programmes which incorporate in their services, safe, efficacious, traditional medicine and to include traditional healers and midwives among their personnel.

It was in the seventeenth century that Leewenhoek of Delft discovered bacteria, but little notice was taken of his work in medical practice until 200 years later, when Louis Pasteur and Koch discovered that the cause of many diseases were pathogenic microbes. Pasteur developed ways of culturing these microbes in laboratories, and showed that it was possible to attenuate some of the dangerous ones for use in immunization. He also demonstrated that bacteria flourish only where bacteria have existed before, thereby quashing the doctrine upheld until that time that '... living things could arise from non-living materials' (Winner, 1978).

Also in the mid-nineteenth century, Semmelweiss in Vienna

showed conclusively that the cause of puerperal fever, from which thousands of women died every year, was an infection carried on the hands of obstetricians and midwives. Although he succeeded in persuading some practitioners to wash or disinfect their hands before examining and delivering women in labour, he met with much incredulity and not a little hostility. It was left to Joseph Lister, some years later, to apply the facts and theories propounded by both Pasteur and Semmelweis. Lister introduced the antiseptic principle into the practice of surgery, and consequently into nursing. Until that time, care of the sick and wounded in hospitals had reflected the general ignorance about the dangers of dirt and microbial infection. There was no conception of asepsis, antisepsis or crossinfection. No attempt was made to keep hospitals clean, surgeons rarely washed their hands, and their assistants in the operating area—including ‘nurses’—wore their ordinary street clothes.

Simultaneous development of nursing

It was fortunate for the science of microbiology that, at about this same time, nursing was being taken out of the hands of the ‘Sairey Gamps’ and being placed into those of Florence Nightingale’s ‘young ladies’. Without this corresponding and concurrent advance in the principles of looking after sick people, the application of the knowledge and techniques developed in microbiology would have been difficult, if not impossible. Miss Nightingale had shown—statistically—the effect of good nursing care on the recovery rate of soldiers in the military hospitals of the Crimea (Cook, 1914). This piece of work probably constituted the first evaluation of nursing ever undertaken. On return from the Crimean War she organized a completely new kind of nursing practice carried out by well-educated women with a high sense of vocation, who were capable of learning and applying basic scientific concepts.

While attacking ‘the germ hypothesis’ and declaring that ‘. . . true nursing knows nothing of infection except to prevent it’, she laid down certain standards relating to cleanliness and bed-spacing in wards which still apply today in the prevention of infection in hospitals. She also recognized the importance of safe water and sanitation (Nightingale, 1859; 1863). In her *Notes on Nursing* she listed the five points she believed were essential to the securing of health of houses. These were ‘pure air; pure water; efficient drainage; cleanliness and light.’ Until the advent of the science of microbiology nurses could do little to obtain pure water and efficient drainage for their patients, but with the discovery of specific

microbes the whole field of public health was opened up and, from it, public health nursing, which went on to become one of the most important branches of nursing. (In the United Kingdom this comprises now, health visiting and district nursing).

Immunology

Following these and later discoveries (of viruses) came the development of immunology. The use of microbes and extracts of microbes to induce immunity to the diseases they cause, was first applied on a large scale during the Boer War, when Almroth Wright used vaccine against typhoid. Since the turn of the century many others have been developed, including those against diphtheria, tuberculosis and tetanus. Today, as soon as a new microbe or virus is isolated, intensive attempts are made to prepare a vaccine from it. In recent years this has succeeded in the case of poliomyelitis, pertussis, measles and rubella. Attempts to produce vaccines against the common cold and all strains of influenza still continue. Many nurses have now acquired the necessary knowledge and skills to take part in immunization programmes, particularly those relating to midwifery and child-care services. Immunizations are a major feature of wellbaby clinics, under-five and school clinics, as well as contributing to antenatal and postnatal care in many countries. Nurses working in factories, stores, universities, colleges and airports in occupational health services, as well as their clinical colleagues in the accident and emergency departments of hospitals, have numerous opportunities to apply the theory of immunology in their daily work.

During and after man-made conflicts and natural disasters, mass immunization of refugees and evacuees is often indicated (although this is a controversial issue in many quarters). When such a programme is decided upon, it is often carried out or supervised by nurses. For those working in clinics of the more affluent societies, storage, transport and use of vaccines raise few difficulties, but for others working in health centres, first-aid posts or visiting dispensaries of the Third World, and without electricity or gas supplies, these programmes present considerable problems. To keep vaccines potent, the whole chain—from laboratory to mud hut—must be efficient and each person involved in it must be knowledgeable, able and competent. Nurses, who are often responsible for the teaching and supervision of auxiliaries, as well as for their own work in this area of health care, must observe conscientiously the advice of microbiologists and other scientists

made available through their own governments and the World Health Organization.

Antibiotics

Although Paul Ehrlich had used arsenical substances successfully, since the early part of the twentieth century, in the treatment of syphilis and other spirochaete infections, systematic chemotherapy did not play a part in the treatment of other diseases until the use of sulphonamides and penicillin in the 1940s. Previously, treatment had been symptomatic and empirical. Lobar pneumonia was a dreaded disease in which, after days of increasing fever, the patient passed into a state of crisis from which he either recovered or died. Even during recovery, he was likely to develop empyema, adding weeks or even months of serious illness. Pneumococcal meningitis and tuberculous meningitis were almost invariably fatal. Patients who developed typhoid fever also usually died, while a diagnosis of tuberculosis meant months of isolation in a sanatorium or hospital and the prospect of living the life of an invalid. Even household and gardening accidents were fraught with danger: septicaemia, cellulitis, multiple abscess formation, deformity and even death would often follow.

The discovery of antibiotics was one of the greatest advances in the curative field, and many illnesses which would have been fatal, even 40 years ago, are today rendered comparatively trivial. In 1928, Alexander Fleming noticed that a fungus spore had contaminated one of the culture plates in his laboratory and had prevented the growth of staphylococci which were being cultured. This observation led to the discovery of penicillin, the first of the antibiotic drugs.

Sulphonamides had been developed and brought into use during 1938–39. The trade name of sulphapyridine, 'M and B 693' became almost a household word in the treatment of pneumococcal and other infections at that time. A third important drug, developed by Waksman in 1944, was streptomycin. This made chemotherapy possible for patients suffering from tuberculosis (Winner, 1978).

Since the mid forties, systematic studies undertaken by research institutes have led to the development of the tetracyclines, erythromycin and the many other antibiotics in use today. More powerful ones were also developed as a result of the discovery of a method to break up the penicillin molecule, while the discovery of drugs effective against pathogenic fungi means that the only conquest yet to be made is that of viral disease (Winner, 1978).

The discovery of antibiotics has meant that the nurse, instead of tending a patient through the crisis period of his illness, carefully observing vital signs, making him more comfortable by tepid sponging and changing his clothing and bedclothes, now administers a prescribed drug ordered by the physician. Before doing so, she must know its action, correct dosage, possible side-effects, signs and symptoms of allergy, contraindicated items of diet, fluid tolerance and she must also be able to give intelligent explanations of his treatment to the patient and his relatives, in language they can understand. In other words, she must now put the patient in the best condition for nature and the drugs to act upon him.

Increased scope of nursing

While this use of antibiotics may have reduced the power of the art of nursing in the curative field, it has increased the nurse's activities and responsibilities in sickness prevention and health promotion. This is an interesting development, taking us back not only to Miss Nightingale, but even further back, to Greek mythology. Throughout the ages, many have maintained that the two daughters of Asclepius (or Aesculapius)—Panakeia goddess of healing and Hygeia, goddess of health—typify the work of doctors and nurses. Panakeia was reputed to heal by her great knowledge of drugs and manipulations. Hygeia, as guardian of health, symbolized that blessed state achieved by living a sane life in a good environment. As Dubos has pointed out, there has often been oscillation between the two points but '... since the teachings of Hygeia require self-discipline, they are commonly ignored. The help of the healer, Panakeia, is sought more often' (Dubos, 1959). Today, the importance of such things as diet, exercise, clean air and a slower tempo of life—or a return to 'a sane life'—is being increasingly brought to our notice by health educationalists, while in many health services there is a greater concentration of resources on the care of the very old and the very young, and an increased emphasis on primary health care. In truth, the canvas for the art of nursing in fields of preventive, promotive and rehabilitative care has never been larger. The followers of Panakeia may have their miraculous drugs and their dramatic manipulations—including organ transplants—but the disciples of Hygeia have a chance to develop their role, not only to include putting patients in the best position for nature to work on them, but also giving the same service to those people who are not patients—and who need never become ill.

Conceptual frameworks and the nursing process

Certainly, in Miss Nightingale's time, nursing procedures and framework consisted mainly of manipulation of the patient's environment. Later there followed a trend to develop nursing procedures, with published manuals. More recently, teaching and textbooks have been based, very often, on diseases or specialties, with doctors contributing to both methods of imparting knowledge. However, the nursing profession is now attempting to develop its own theories and concepts, and today many nurses are recognizing the need to base their practice on a conceptual framework. However, developing that framework is not easy and much of the literature on the subject of the nursing process has tended to focus on its five stages, making little or no reference to the framework upon which the process is to be based (Luker, 1979). Planned care may, of course, be derived from many different frameworks, such as a body-systems framework, a needs framework, a disease framework or a daily activities framework. They are not mutually exclusive, but regardless of which or how many are used, each stage and each framework is likely to be influenced by one or more of the theories relating to microbiology. This will apply to any of the many settings available to nurses today.

Prevention and control of infection in hospitals

Turning first to the place where, as yet, most nurses undertake the larger part of their training, it is worth recalling that '... it may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm. It is quite necessary, nevertheless, to lay down such a principle' (Nightingale, 1863). Today, it is just as necessary. But today the art of nursing has a greater body of knowledge, more effective skills (and attitudes based on both) with which to achieve it.

While institutional housekeeping may no longer be the responsibility of the nurse, nevertheless, for the sake of her patients, she must be prepared to act in this role if necessary. Scientific housekeeping is now a specialized occupation and field of study: teaching the value of cleanliness and order in hospitals may still be one of the nurse's most important services (Henderson and Nite, 1978). Cleaning and disinfection require not only a knowledge of microbiology but also a knowledge of chemistry and the principles of vermin and pest control. Hospital environments carry a greater risk of infection than any other and a major problem in many hospitals is that of nosocomial infections. They may be caused by

microorganisms from a number of sources: from another person in the hospital (cross infection); from an inanimate object or substance which need not have been contaminated by a human source (environmental infection); or carried by the patient before the appearance of the disease (self infection) (Parker, 1978). The microbial diseases acquired in hospital are extremely varied, but most fall into one of three groups:

1. Septic infection or 'sepsis'. This is usually characterized by local acute inflammation, with or without the presence of pus. It includes infections of wounds and of the respiratory and urinary tracts (Farrant, 1978). It may become generalized (septicaemia), and metastatic septic lesions may appear elsewhere in the body. Less often, septicaemia or a metastatic lesion may appear without an initial septic lesion at the point of entry of the microbe
2. Diarrhoeal disease
3. 'Conventional' infectious diseases, such as measles or influenza (Parker, 1978).

The pattern of hospital-acquired infection depends upon a number of factors relating to the structure, the organization and also to the activities within the hospital. The prevention of hospital-acquired infections depends, therefore, upon the continuous and concentrated efforts of all who design, administer and work in hospitals. Some outbreaks do not differ from those which occur in other institutions such as universities, schools and hotels. A hospital population usually shares a common supply of water and food, and members come into close proximity with one another. Outbreaks of enteric, diarrhoeal and food borne diseases, a variety of respiratory tract infections and the infectious diseases of childhood may therefore occur in any institution from time to time. However, the consequences of these diseases may be more serious for some categories of hospital patients than for healthy persons. While the temptation to take unnecessarily elaborate precautions should be resisted, the optimal mix of safe procedures is usually agreed and implemented with appropriate orientation of hospital staff—including nurses. Many hospitals have an infection control committee, responsible for codifying infection prevention practice. Microbiologists play a leading part in all control activities which should include:

1. Performing tests on specimens from patients to establish a diagnosis and to assist in choosing appropriate antimicrobial treatment
2. Compiling information from routine diagnostic work and

from other sources about the frequency of clinical infection, the importance of individual pathogens, and their resistance, if any, to antimicrobial agents

3. Starting epidemiological investigations of hospital-acquired infections to determine their sources and routes of spread
4. Giving advice on the control of current outbreaks in the light of this information
5. Taking a leading part in planning the hospital's programme for the prevention of infection and in educating all grades of hospital staff in correct hygienic procedures (Parker, 1978).

Methods for performing specific procedures that carry an infection risk for either the patient or the staff member are usually laid down by the infection control committee; those affecting nursing staff include:

1. Care of surgical wounds
2. Catheterization and closed bladder drainage
3. Care of tracheostomy and tracheal suction
4. Intravenous injection, cannulation or therapy
5. Lumbar puncture
6. Paracentesis
7. Pre-operative skin preparation
8. Procedures which require the use of anaesthesia
9. Respiratory therapy
10. Renal dialysis
11. Collection of specimens for laboratory examination.

Specialist departments

Aspects of operating theatre practice relevant to the prevention of infection include design and ventilation; cleaning of the theatre; hand decontamination and the use of gloves; pre-operative skin preparation, and the discipline of staff members. Affecting day-to-day patient care are those which not only relate to specific patient-orientated procedures, but also to the organization and cleaning of specific areas such as nurseries (newborn infants are extremely susceptible to infection—the eyes, umbilicus and skin being especially vulnerable); the use of dressing or treatment rooms; sterilization of instruments, equipment and dressings (in the majority of hospitals this has led to the introduction of central sterile supply departments); the handling of soiled linen in wards, departments and hospital laundry; storage; preparation, cooking, and serving of food; replenishment of individual water carafes;

washing of cutlery and china and the cleaning and disinfection of clinical thermometers, urinals and bedpans.

The nurse must also understand the definition of terms used in disinfection and sterilization techniques—the differences between germicides, sporicides and fungicides. She must be aware that tissue cells and microbes are both living protoplasm; a physical or chemical agent destructive to one will be destructive to both. She must know the different methods of sterilization: moist heat, dry heat, and gas or vapour. She must be able to protect stock solutions and pharmaceutical preparations from contamination, and practise the correct disposal of syringes, needles, contaminated equipment, waste, soiled dressings and fomites. In addition, she must see that

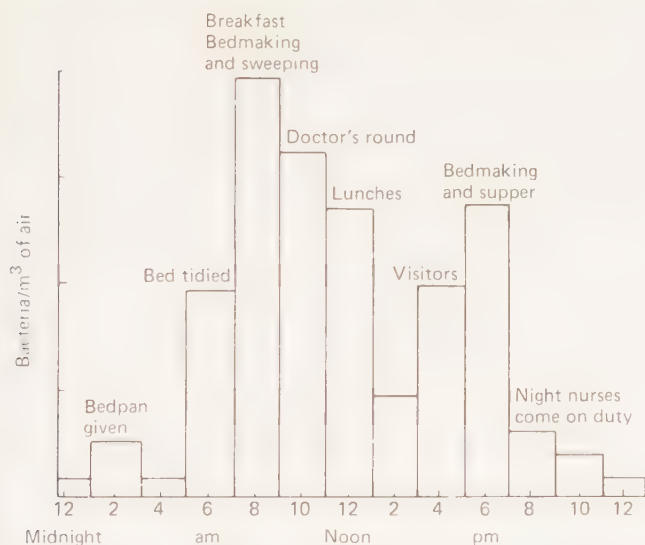


Figure 8.1 The effect of activity on the bacterial content of air in a hospital ward

dressings and other surgical procedures are not carried out in the ward when air contamination is high—for example at times of meals, visitors, routine ward rounds, bedmaking, sweeping (Figure 8.1). Her knowledge of microbiology will also influence any work she undertakes in hospital planning: architecture, equipment, toilet facilities, flooring and furnishing will all need to meet certain criteria (Henderson and Nite 1978).

These and other considerations will apply to nursing practice in every setting and in every specialty. Some will contain additional procedures influenced by this science: reverse barrier nursing, for

instance, is often practised in midwifery to protect premature infants. It is also practised in oncological nursing of neutropenic patients. For these patients, food has to be made 'sterile' and served under strictly aseptic conditions (Tiffany, 1978).

If the government of the country has not already done so, the hospital infection control committee also prepares a list of those microbial diseases that are considered to be transmissible and for which isolation, either within the hospital or by transfer to an infectious diseases unit, is mandatory. The alternatives for protective isolation which are currently available and with which nurses now have to be familiar are:

1. Single rooms with positive-pressure ventilation
2. Rooms with laminar flows of air
3. Plastic enclosures (isolators) in open wards
4. Ultraclean wards (usually multibedded but not mechanically ventilated) (Parker, 1978).

Their relative efficiency has not yet been evaluated and reported, but in the United Kingdom, a steering group set up by the Department of Health and Social Security in 1976 to study the suitability and effectiveness of the Trexler Containment Patient Isolator, reported one year later that it is 'microbiologically competent to an acceptable degree' (Yellowlees, 1978). A number of the hospital units designated for the reception of cases, or suspected cases, of Lassa fever, have acquired such isolators and nursing staff have been trained in their use.

Communicable diseases

Nowadays, air travel can bring diseases such as Lassa fever to the very doorsteps of households in the Western World, and in 1977 the Public Health Laboratory Service, on behalf of the Department of Health and Social Security and the Welsh Office, set up the Communicable Disease Surveillance Centre to help coordinate the investigation and control of communicable disease in England and Wales.

Communicable diseases of man are caused by the attempted colonization of his body by parasites of various species, the progeny of which can, in several different ways, be transferred to another human host. This concept of disease as a manifestation of parasites involves its study as a biological phenomenon rather than as a clinical one. Sources of infection can be human—cases, contacts and carriers—or animal. For continued existence of the species, the infecting organism must, from time to time, be transferred from one host to another. Therefore, for a time, the colonization of the host

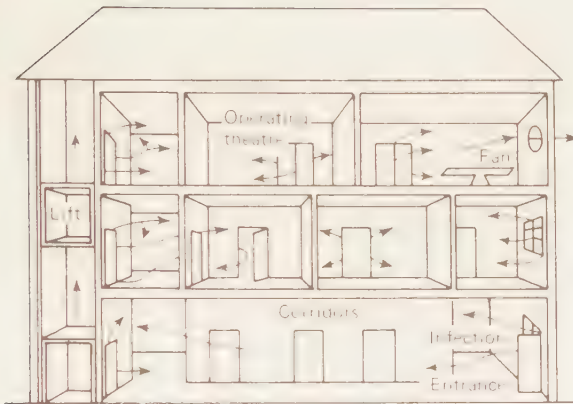


Figure 8.2 Routes of infection within a hospital building

by the organism must be at a site from which it can be disseminated. This represents the period of illness. With many communicable diseases, patients are most infectious during the early stage, often at the end of the incubation period and before the illness is clinically detectable. The infecting organism may be set free naturally or it

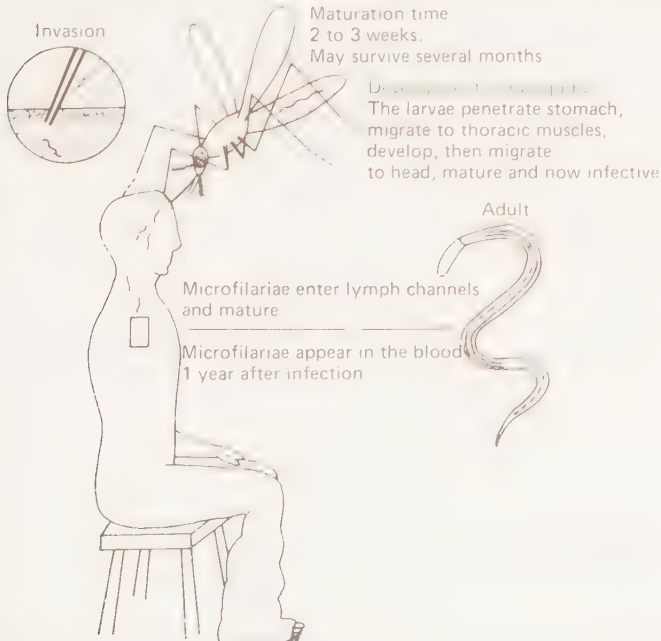


Figure 8.3 *Wuchereria bancrofti*. Found in Asia, Africa, South America and Australasia

may be extracted by an insect. 'Natural' methods include transmission by droplets (from the respiratory tract), by discharges (from mucous and cutaneous surfaces) or by excretions (from the alimentary and urinary tracts). All have very great relevance to nursing practice.

The 'extracted' method is the aspiration of pathogenic organisms in blood or tissue fluids by arthropods: for example mosquitoes are connected with malaria, lice with epidemic typhus. Each species of parasite tends to use a particular portal of exit from the host, a particular route of transmission and a particular portal of entry into

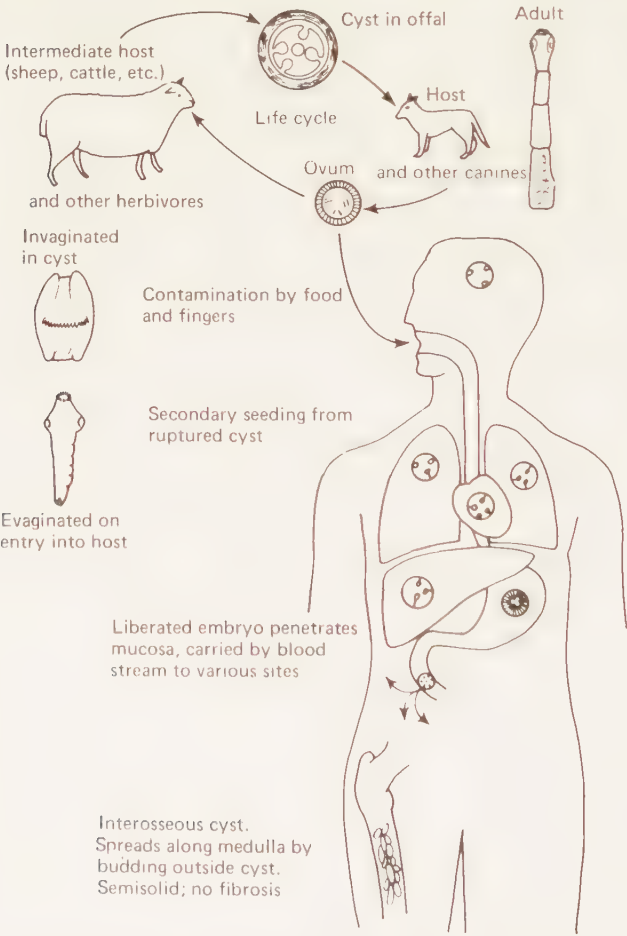


Figure 8.4 Echinococcus granulosus, causing hydatid disease. Geographical distribution world-wide (sheep-raising areas)

a new host. During transfer, the organism is exposed to unfavourable chemical and physical environmental conditions (e.g. temperature, humidity, solar radiation) and comparatively few survive to reach a new host. Routes of transmission depend upon the infection, and can be airborne (*Figure 8.2*), insect-borne (*Figure 8.3*) or animal-borne (*Figure 8.4*). Ways in which infecting organisms can enter a new host are by ingestion (e.g. dysentery, cholera, food poisoning); by inhalation (e.g. influenza, common cold, smallpox); by injection (e.g. malaria from the mouth of the mosquito and rabies from the mouth of a dog); by inoculation (e.g. epidemic typhus through scratches or pyogenic infection of wounds or gonorrhoea on mucous membranes) and penetration (e.g. schistosomiasis).

Successful colonization of the host by the infecting organism depends upon several factors relating first to the organism's pathogenicity (infectivity, invasiveness and virulence) and the size of the 'infecting' dose, and secondly to the host's immunity (whether innate or acquired, natural or artificial, active or passive) and non-specific resistances (based on genetic factors; age, sex, occupation, state of mucous and cutaneous surfaces, effects of trauma, chill, fatigue, malnutrition, concomitant disease, etc.) Again, it can be seen that manipulation of the victim's environment to withstand infection, has many implications for the nurse.

The reaction of the new host to attempted colonization by the organism may or may not constitute disease. There will be a delay between the invasion and the appearance of symptoms. This incubation period has a range of time within fairly constant limits: for yellow fever it is 2–6 days, for typhoid 3–38 days, and so on. A knowledge of incubation periods is important in retrospective surveys (contact tracing etc.) and regarding the segregation and surveillance of contacts. These practices, together with immunization campaigns, contributed greatly to the recent success of the smallpox eradication programme.

Prevention of communicable disease

Preventive measures fall into five groups and the nurse has a part to play in each. The first group relates to the target population and consists of immunization, increase of non-specific resistance, health education, and chemoprophylaxis. The second concerns the entry portal. For contact infections, this requires attention to personal hygiene and care of the skin; provision of adequate toilet facilities; avoidance of contact, and protection of the skin, especially of the feet. For airborne infections, preventive measures include the

wearing of surgical masks by those attending patients and the avoidance, by others, of all infected persons and places. Against insect-borne infections, suitable clothing should be worn, nets and insect repellants used and buildings suitably screened. Measures related to ingested infections include attention to the hygiene of all food services and the avoidance of unhygienic sources.

Routes of transmission also have a bearing on preventive measures. For contact infections, attention should be paid to the cleanliness of floors (especially those areas where people walk barefoot), laundering arrangements, hairdressing and barber facilities and work areas. When dealing with airborne infections, prevention of overcrowding (including bed-spacing), ventilation, dust suppression, and preventive measures against fomites are all important. Measures should be directed against the vector when combating the spread of insect-borne diseases. Such measures include the prevention of vector breeding; destruction of larvae, pupae and adult forms; the use of insecticides, and alterations in the environment to make it hostile for the vector. In all community environments it is essential to take adequate precautions against ingested infections. Strict attention must be paid to hygiene, in food production, storage, transportation, preparation and cooking; to the health and behaviour of food handlers; to regular inspections; to selection and protection of sources of drinking water; to water purification; to antihousefly activities; and to sanitation, with particular regard to waste disposal, especially of faeces and urine.

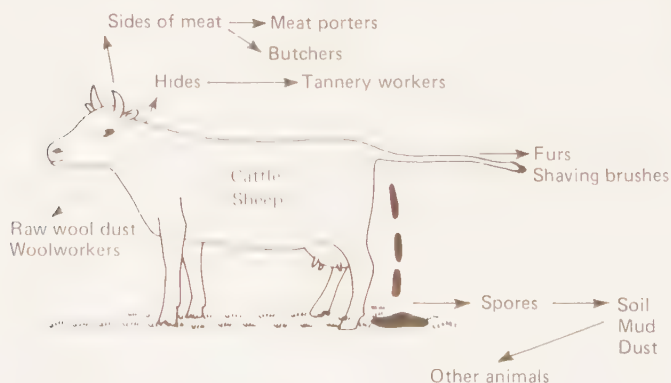


Figure 8.5 The spread of anthrax

Measures relating to the exit portal include current and terminal disinfection of infective excretions and discharges from human

sources, and of soiled articles. If the source is human, he is isolated and his disease notified to the appropriate authority. Treatment must include care with disposal of excreta, and with handling and transfer of the body, if death occurs. If the source is animal, again it is isolated and its disease notified to the appropriate authority. Again, careful disposal of excreta and of the carcass if death occurs is vitally important (*Figures 8.5 and 8.6*).

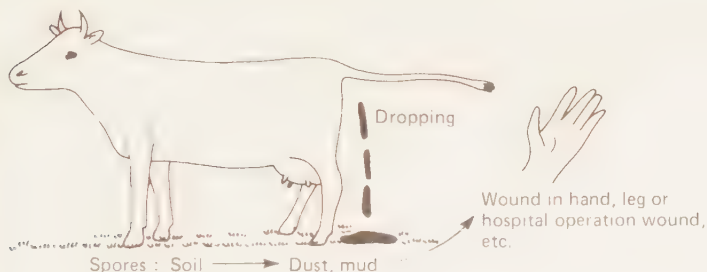


Figure 8.6 The spread of gas gangrene and tetanus spores from soil and dust

Control of communicable disease

If the source is human, a thorough search must be made for other cases, especially those that are 'missed', mild and ambulatory. Early diagnosis, isolation, treatment notification and contact tracing are all essential activities. If the source is animal, the control measure most frequently adopted is destruction of the beast.

A rapid and thorough investigation is necessary to trace the spread of disease and to determine the specific action required at each point along the chain of infection.

Fluctuations in incidence may be general trends, periodic cycles (e.g. measles every two years), seasonal outbreaks (related to climate, customs, habits, prevalence of insects, pests etc.), or irregular fluctuations caused by population movements (e.g. refugees, pilgrimages, changes in social conditions), wars or exceptional weather conditions.

The balance

There tends to be a balance between hosts on one hand and parasites on the other. Factors which may upset this balance can be alterations in the immunity or resistance of the hosts; alterations in prevalence, infectivity, invasiveness and virulence of the parasite; and changes in the herd environment (e.g. climate, malnutrition, poverty, housing

and population density). It is, of course, this last factor which so often causes outbreaks of communicable diseases in areas struck by disaster of one kind or another. Important factors likely to result in the genesis of an epidemic are:

1. Increased numbers of sources (probably imported)
2. Increased dispersion of the infecting parasite
3. More favourable environment for transmission
4. Increased accessibility of new hosts to the parasite
5. Increased numbers of susceptibilities
6. Increased infectivity of parasites

Public health programmes

Water supply

A safe and adequate supply of water is essential to life. The bacteriological, chemical and physical condition of water supplies available and accessible for human consumption must comply with established standards. The provision of drinkable water is always more important than the provision of food. In emergency situations, equipment for water purification and for sinking wells is often a top-priority supply. Generally speaking, ground water is safer than surface water, but established guidelines for the investigation and selection of sources under such circumstances should be followed (Skeet, 1977). Treatment may be improvized as necessary, according to the degree of impurity of the water and materials available. It may take various forms. Disinfection kills pathogenic organisms and thereby prevents the spread of water-borne diseases. Disinfection of water can be carried out by boiling or by chemical treatment. The latter usually consists of the introduction of chlorine or chlorine-liberating compounds, either gas chlorinators or hypochlorinators. The batch method is usually used in the absence of chlorinators. Other methods include coagulation-disinfection; coagulation-filtration-disinfection and filtration-disinfection (Skeet, 1977).

Storage, distribution, purification and sterilization (when necessary) of the water supply are all stages requiring the application of a knowledge of microbiology.

Sanitation

In many situations and settings (particularly in Third World countries) the nurse will also need to supervise and instruct in methods of sanitation: solid waste collection and disposal; collection

and disposal of refuse, manure and animal carcasses. In refugee camps her responsibilities may include waste-water disposal; organization of baths, showers and washing up; laundry facilities; disinfection and disinfestation rooms; abbatoirs; mortuary service and burial of the dead; vermin control; cleaning of emergency shelters; protection of food supplies; and—very important—education of the victims themselves in these matters. If these, and other similar duties, are to be performed intelligently and competently, a sound knowledge of basic microbiology is essential.

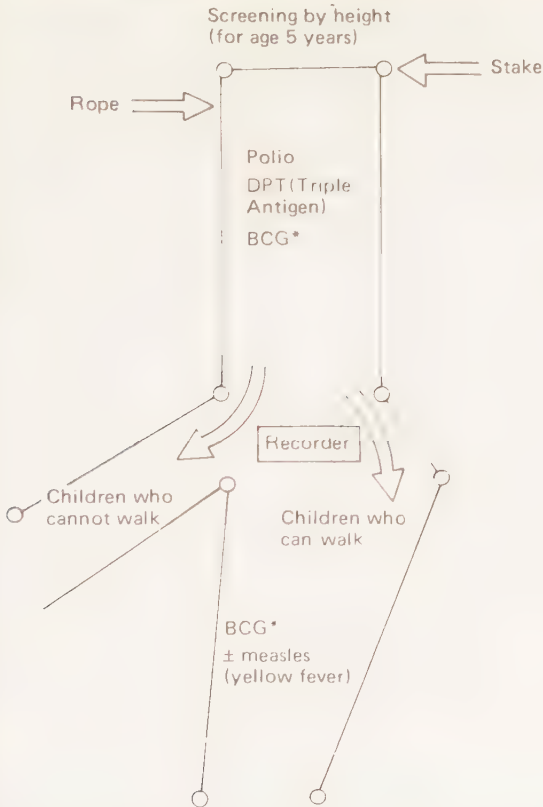


Figure 8.7 A model for mass childhood immunization. (From Foege and Foster, 1974)

Vaccines

There are inherent dangers in all vaccination procedures, and the diseases in which vaccination has played a dominant part in the

reduction of mortality are those resulting from the action of a bacterial exotoxin, for example diphtheria and tetanus, or those resulting from infection from a virus, for example poliomyelitis, smallpox and yellow fever. A poor standard of hygiene cannot chiefly be blamed for the transmission of any of these, but the same cannot be said for the intestinal infections of cholera and enteric fever. In protection against these diseases, immunization should never be regarded as more than an adjunct to the radical measures of controlling the source and the means of transmission of infection, by strict attention to personal and environmental hygiene in the widest sense. In disaster situations, energetic and ruthless public health measures may well achieve greater and more rapid results in the control of intestinal infection, than mass immunizations. The ideal for any country is for the routine immunization of its population to be so well organized that mass immunization should seldom, if ever, be called for (*Figure 8.7*).

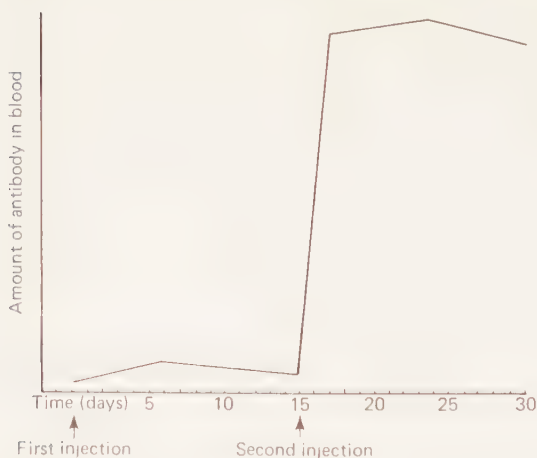


Figure 8.8 The antibody response after the first and second doses of a non-living antigen

If large numbers of people are to be vaccinated, one of the many devices which use a high-speed jet may be used. Syringes and needles have several disadvantages—they may be stolen, they are cumbersome to sterilize and there is always a danger of serum hepatitis if techniques are poor. The development of attenuated strain vaccines for oral administration—such as the poliomyelitis vaccine used at present—avoids all these difficulties and dangers

(Figure 8.8). In future, as other vaccines become available, this method may be extended in the prevention of other diseases.

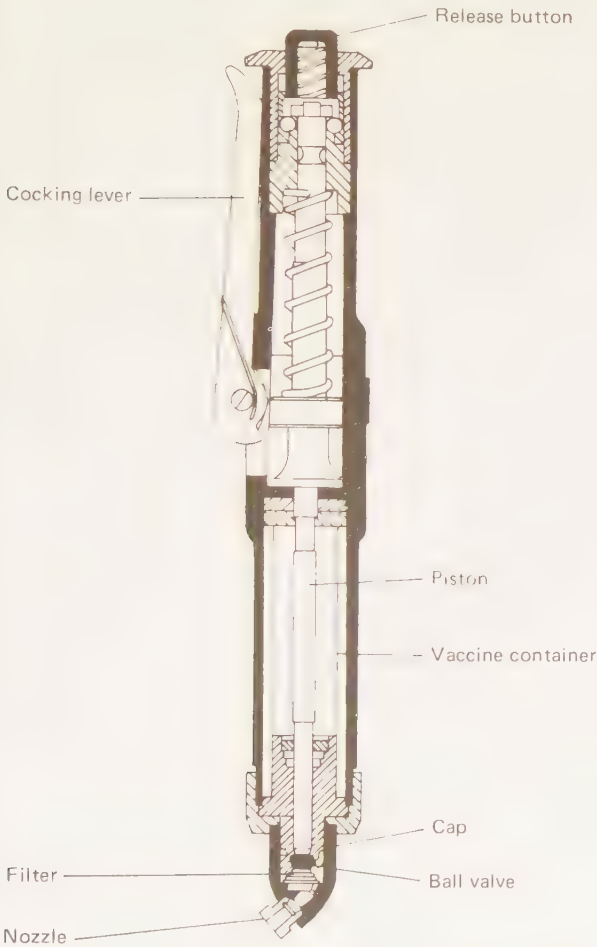


Figure 8.9 The Panjet, manufactured by Wright Dundee Group, Dundee

Responsibilities of the nurse

All vaccines must be stored in a temperature of between 2°C and 10°C—not below and not above. Paraffin or kerosene refrigerators are adequate if gas or electric ones are not available.

Live vaccines should never be exposed to sunlight (this is particularly important to remember when using BCG). Live liquid vaccines may be transported on ice in thermos flasks. If freeze-dried BCG vaccinia and triple vaccines are transported, they must be re-refrigerated immediately after arrival. The makers' instructions with each brand of vaccine should be read and followed. Records of all vaccines given must be kept at all times.

Syringes which have been stored in an antiseptic solution should not be used for giving live vaccines: fluid remaining in the syringe will kill the vaccine (*Figure 8.9*).

The influence of the science of microbiology on future nursing practice

This account of lines of influence of one science on the art of nursing is by no means exhaustive, and microbiology will continue to affect nursing practice of the future. Reports have been made recently of 'new diseases' appearing, sometimes aided by man's own efforts to alleviate illness.

One report details the discovery of a new bacterium which causes pneumonia and which has contributed to the deaths of at least seven kidney-transplant patients over about a year. In order to suppress the body's natural rejection of organs transplanted from another person, patients are given large doses of immunosuppressive drugs. Because the immune system, which is responsible for the rejection, also protects against infection, immunosuppressed patients are particularly susceptible to infection. They are thus open to attack, not only by recognized pathogenic micro-organisms, but also by others not normally associated with disease.

Potentially fatal pneumonia developing in immunosuppressed patients is particularly difficult to diagnose as it may be caused by a variety of bacteria and viruses. A new cause recently has been added to the list—the Pittsburg Pneumonia Agent—provisionally named after the hospital where it was first recognized. In some ways, this agent resembles the bacterium responsible for the notorious Legionnaire's Disease, first recognized only a few years ago after a severe outbreak of pneumonia among ex-servicemen attending a Convention. The Pittsburg agent, however, is proving even more difficult for bacteriologists to isolate, grow and study in the laboratory.

The other 'new' infection reported in 1979 also coincidentally comes from Virginia, and involves an extremely unusual phenomenon, bacteria infecting human red blood cells. Although

parasites such as malaria and babesia infect red cells, a bacterium directly attacking red cells in humans has never been reported before, except for the exotic *Bartonella bacilliformis*.

That bacterium causes Oroya fever, a disease confined to a small region in the Andes because of the restricted range of insects that transmit the bacterium. The patient had undergone splenectomy and, although removal of the spleen usually has no ill effects, it is known to reduce the body's ability to deal with red blood cell parasites such as that causing malaria (*New England Journal of Medicine* 1979).

On a happier note, the prospect of a vaccine against serum hepatitis has improved (although that of an effective treatment against the disease has receded). Two lines of research are being followed, one through the growth of liver cancer cells and the other through the genetic engineering of bacteria (*Nature*, 1979). The latter method represents a new approach and has been opened up by scientists in the United Kingdom. Research workers at the Searle laboratories are working with fowl plague virus which causes influenza in chickens and is closely related to the virus that causes human influenza.

Other new discoveries may affect some counselling practices. A research study in the United States has shown that infection of the amniotic fluid surrounding the unborn baby (a rare but serious complication of late pregnancy) occurs more frequently among women who have had sexual intercourse during the month before the birth of their babies. The standard advice, given at many antenatal clinics, that sexual intercourse may safely be continued throughout pregnancy, may have to be revised accordingly (*New England Journal of Medicine*, 1979).

Thus the application of new theories, new concepts and new approaches in the science of microbiology continue to influence the art of nursing. It was, after all, Pasteur himself who said in 1872, 'There are no such things as applied sciences, only applications of science'.

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The contribution of the biological sciences to the art of nursing

SUSAN E. MONTAGUE

In 1859, Florence Nightingale wrote that the goal of nursing is to '... put the patient in the best condition for nature to act upon him.' For many, these words still ring true and imply that nursing involves both science and art. While scientific principles should underlie the process of putting the patient in this optimum condition, this process also involves skill in its application—and the skilful application of any science is an art.

The nature of nursing

Developments in biological and medical sciences, particularly since the Second World War, have led to new demands being placed on nurses. These, for example, may involve them in the use of complex apparatus and equipment and necessitate continual adjustments in the nursing curriculum. Subsequent changes in nurse education and the fact that there is a still small, but ever-increasing, number of nurses thinking about, writing on and researching into 'the nature of nursing', have all contributed to the developing role and responsibilities of nurses. Nowadays, nurses no longer see themselves as mere handmaidens of the doctor in implementing medical care, but as professional practitioners, independently devising nursing intervention in patient care.

Virginia Henderson defined the unique function of the nurse as '... to assist the individual, sick or well, in the performance of those activities contributing to health or its recovery (or to peaceful death) that he would perform unaided if he had the necessary strength, will or knowledge. And to do this in such a way as to help him gain independence as rapidly as possible.' Miss Henderson goes on to say that it is this aspect of her work that the nurse initiates and controls, '... of this she is master.' She also, as a member of the health care team, liaises with other members of that team (including the patient) to plan and implement the total programme of care and treatment (Henderson, 1966).

If this is so, the qualified nurse will often be required to make independent decisions in order to solve problems relating to patient care. This immediately brings into the foreground the concept of 'safe' practice. Here one can usefully return to the teaching of Florence Nightingale '... the hospital shall do the sick no harm.' It is my contention though, that 'safe' practice now involves more than this. It involves professional responsibility to ensure that the patient receives care based on current knowledge and resources. It therefore seems indisputable that today's professional nurse must be equipped to solve problems in an intelligent and resourceful way. This implies that she must be in possession of relevant facts and understanding, and be able to apply these skilfully.

Developing a 'theory of nursing'

What knowledge must the professional nurse possess? This is perhaps one of the most controversial issues that nurses now grapple

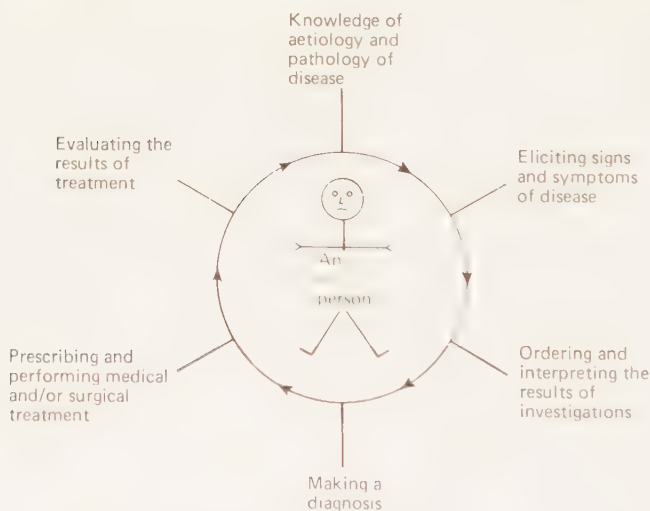


Figure 9.1 A medical approach to the process of care

with—that of developing, or attempting to develop 'a theory of nursing'. Possession of a unique body of knowledge is one of the essential criteria of a profession (Carr-Saunders and Wilson 1964).

One of the major barriers to the development of a 'theory of

nursing' is the very diversity and dynamism of nursing itself. Another lies in the education of nurses, where perhaps there has been an over-reliance in the United Kingdom on members of the medical profession to teach nursing students. This has inevitably led to nurses being presented with material which directly relates to the characteristics of a doctor's rather than a nurse's role as a member of the health care team. By 'doctor's role' I mean that of diagnosing the presence or absence of disease and prescribing and performing specific medical and/or surgical measures which aim to cure or to reduce the effects of disease. The medical model or approach to the process of care, therefore, emphasizes pathology and medical diagnosis and treatment as a framework for learning. It is represented in *Figure 9.1*.

In contrast to the medical approach, the nursing approach to the process of care views each individual as 'someone with health needs'. This relates more clearly to the wide variety of nursing roles in the care and comfort of people undergoing medical treatment. It presents a framework for the provision of appropriate nursing care, whatever the situation, and is illustrated in *Figure 9.2*. The sequence of events shown in *Figure 9.2* make up what is now commonly termed 'the nursing process'.

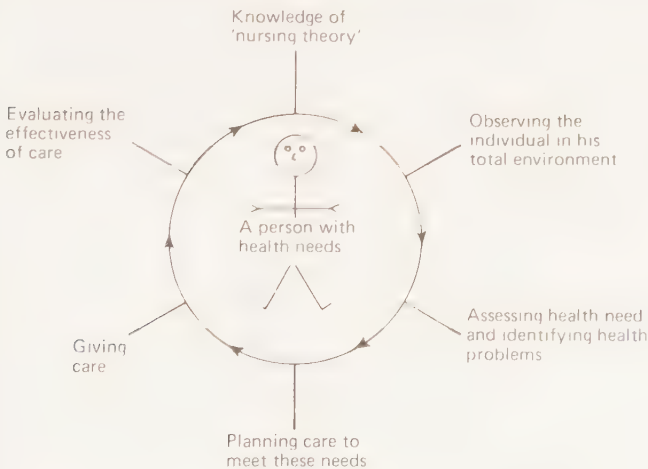


Figure 9.2 A nursing approach to the process of care

This approach to nursing is becoming, and must be, central to the analysis of what constitutes nursing theory and nursing method. It involves the ability of the nurse to take an analytical approach to her

work, to organize her knowledge, and to base practice on theory. In fact, it involves developing a way of thought and action. There are obvious parallels between the steps of the scientific method and those of the nursing process, as discussed in Chapter 3 by Ian Hargreaves: a further indication of the scientific basis of nursing.

The biological sciences

The term biological science means 'knowledge of life'. Biology comprises two major subject areas, that of zoology (knowledge of animal life) and botany (knowledge of plant life). From these have developed the now firmly established disciplines of anatomy, physiology and microbiology.

The structure of living things is the subject area of anatomy, while physiology is the science of the normal functions and phenomena of life—a biological science with the particular aims of describing, explaining and understanding how living things work (Robinson, 1975). Microbiology comprises the body of knowledge about small organisms which can usually be seen only with the aid of a microscope.

Each of these subjects has several branches, which have arisen from the orientation or specialization of an area of study within them. For example anatomy includes comparative anatomy, histology and cytology; physiology comprises mammalian physiology, respiratory physiology and neurophysiology; while microbiology includes both bacteriology and virology. Several specialized sciences have their roots in these older disciplines and, as techniques have developed and new discoveries have been made, have more recently attained their independence. Examples of these subjects are pharmacology (knowledge about how drugs affect the body), genetics (knowledge relating to inheritance) and immunology (knowledge of the function of the immune system).

The subject matter of biochemistry and biophysics specifically link physical science with biological knowledge, while nutrition and anthropology have roots in biological and social science.

By now it should be clear that the subject matter of all the disciplines which may be classified under the term 'biological science' has close interrelationships and areas of overlap. This means that, in many instances, it is difficult to say that a certain fact, or body of facts, is specifically the property of one or another discipline.

Biological science is founded in the laws of the physical sciences of chemistry, mathematics and physics. As Jennifer Boore has shown

(see Chapter 7), there are numerous applications of the physical sciences in the analysis of living processes. For example, the laws of Boyle and Charles, which relate to the effect of pressure and temperature on the volume of gases, have important applications in understanding respiratory function (lung volumes and the carriage of gases in the blood).

It is often assumed that biological phenomena can be completely understood in terms of the physical and chemical properties of the constituent molecules of living systems, but it may not be as simple as that. Many processes that take place in living creatures can be interpreted satisfactorily in these terms. However it is at least arguable that there is something intangible about the organization of living systems that makes them more than the mere sum of their physiologically explicable parts (Robinson, 1975). In the words of Robinson (1975) '... the laws of physics and chemistry tell us some of the things a living creature cannot do, but not necessarily what it will do, or by which of a number of possible methods it will do it.'

The more recently developed social sciences have also contributed to the understanding of biological phenomena. One of many examples of this would be that an understanding of the social factors which affect the characteristics of human food consumption has illuminated biological knowledge of human bowel function. A further example is the link between psychological phenomena, particularly those associated with the experience of stress, and the endocrine responses which occur in such situations.

It seems then, that none of these bodies of knowledge, physical science, biological science and social science, can be viewed, exclusively, in isolation from the others.

Nursing and the biological sciences

There is a component of nursing which is based on a knowledge of the biological sciences. The General Nursing Council for England and Wales and the requirements of the EEC (European Economic Community) directives (Quinn, 1980) recognize this position by including several of the subjects mentioned above, for example, anatomy, physiology, microbiology, in the syllabus of training and in the examinations leading to qualification. However, while there is general agreement that nurses should have knowledge of the biological sciences, there is no precise information on why they need such knowledge, or the uses they make of it. I will discuss this position and attempt to illustrate the potential contribution of anatomy and physiology to the art of nursing.

The evolutionary basis of structure and function

Many teachers of nursing now take a functional approach to the teaching of biological sciences and some now entitle their courses 'Structure and Function' or even 'Function and Structure', rather than 'Anatomy and Physiology'. The rationale underlying this approach, I think, has its basis in evolutionary theory. The secret of biological success, in terms of survival of an individual organism and its ability to reproduce and so perpetuate its own genes and the species, lies in the ability of that individual to adapt to and survive in its environment. Adaptation to the environment necessitates efficient function and it is on this feature that natural selection has its action. This means that the structures, large or small, that are integrated to produce this function, are likely to be preserved in the offspring of the successful individual. Structure and function are therefore mutually interdependent. The nurse requires specific knowledge of human structure and function, but must also realize that a great deal of human physiology can be, and has been, learnt from the study of other species, particularly mammals.

Human physiology provides the normal baseline for the study of abnormal function, which is the province of pathology, medicine and nursing. It is essential to understand normal function in order to recognize and evaluate the abnormal, or to take action to prevent, compensate for, or remedy departures from normality (Robinson, 1975).

Certain concepts are fundamental to the biological and physiological contribution to nursing science. These have their origins in the teaching of the French physiologist Claude Bernard, in 1857, and to the evolutionary theory of Charles Darwin (1859), at almost exactly the same time that Florence Nightingale was writing her 'Notes on Nursing'.

The concept of physiological balance

The normal functioning of the cells of any animal or plant depends on their ability to maintain certain physicochemical properties of their constituents (such as temperature, state of hydration, electrolyte and hydrogen ion concentration and the concentration of nutrient and waste products) within constant, relatively narrow ranges. This is essential because a high proportion of cellular constituents are protein molecules. These proteins may be part of the structure of the cell, or enzymes controlling metabolic reactions. In either case, the integrity of these proteins is essential to normal cell function. Proteins are easily destroyed by abnormal temperature or acidity, because of their structure, and the action of enzymes can be

markedly altered by these factors and by other factors such as substrate concentration or the presence of their metabolic end products.

As all living cells are dynamic, open systems, continually using and producing substances as a result of their metabolism, they must be able continually to exchange with their immediate environment in order to maintain a constant composition. Unicellular animals have few problems in maintaining a constant intracellular state, because the environment that surrounds them is vast in comparison with their volume. They therefore have wide access to a supply of nutrients, and the dissipation of their waste products negligibly changes the composition of their environment.

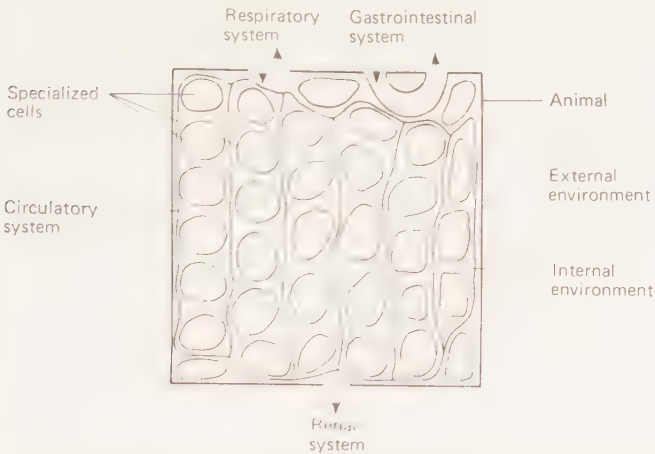


Figure 9.3 Model of a complex multicellular animal. Each specialized cell is in direct contact with its immediate internal environment and, via the circulatory system, with every other cell and with the external environment

However, as multicellular organisms evolved and their cells developed increasing specialization of function, so some of these cells lost direct contact with the external environment. Such cells were then potentially unable to maintain constant composition, and a biological need arose for other cells to become specialized as transport systems within the organism (the blood and circulatory system). Other cells became specialized in the acquisition of nutrients and the removal of waste (the respiratory system, gastrointestinal tract and kidneys). In this way, all cells indirectly remain in constant contact with the external environment (*Figure 9.3*).

The interior of any cell is largely water. This water, its solutes and emulsified constituents, is termed intracellular fluid. The fluid surrounding the cells is, logically, the extracellular fluid. Approximately 60 per cent of the body weight of an adult male weighing 70 kg is water. This represents a volume of about 45 litres (cubic decimetres; dm^3) and of this, 30 dm^3 is intracellular and 15 dm^3 extracellular. This extracellular 'pool' is therefore small in comparison with intracellular fluid volume and is divided as follows:

Extracellular fluid – interstitial fluid (that surrounding cells) + plasma

It was Claude Bernard who realized that the extracellular fluid acts as a 'middleman' for all exchanges of matter between a cell and any other cell, or the external environment. It provides the cells of higher animals with a secluded, thermostatically controlled and chemically stable 'internal environment'. Claude Bernard pointed out in his now famous phrase, '*... la fixité du milieu intérieur est la condition de la vie libre, indépendante*'; that the stability of the internal environment is a condition for the free and independent existence of the whole animal.

Not surprisingly, a large number of mechanisms co-operate to maintain uniform physical properties and chemical composition in extracellular fluids. These mechanisms operate via the systems, described earlier, which communicate with the external environment. They are controlled and co-ordinated by further specialized cells which comprise the nervous and endocrine systems.

Homeostasis and its regulation

This maintenance of uniformity was termed 'homeostasis' by the American physiologist, Walter B. Cannon, in 1929. The regulating mechanisms that work towards it are called 'homeostatic mechanisms'.

A homeostatic mechanism is triggered by a change in the value of some physiological variable or property of the extracellular fluid. It acts by negative feedback to restore or preserve the normal value by producing a change in the opposite direction. Some mechanisms are more complex than others. At its simplest a homeostatic mechanism requires the following:

1. Detectors—usually nervous structures which monitor the magnitude of variables to be controlled. For example, baroreceptors which monitor the degree of stretch in the walls

of the great arteries and hence blood pressure, or osmoreceptors in the hypothalamus which monitor the osmolality of the blood.

2. Effectors—organs like muscles, glands, blood vessels, the heart and the kidneys which can effect the necessary compensating changes.
3. Coordinating mechanisms—nervous and endocrine which couple the receptors to the effectors and ensure that responses are appropriate in magnitude and timing.

Figure 9.4 shows an example of a homeostatic mechanism in diagrammatic form.

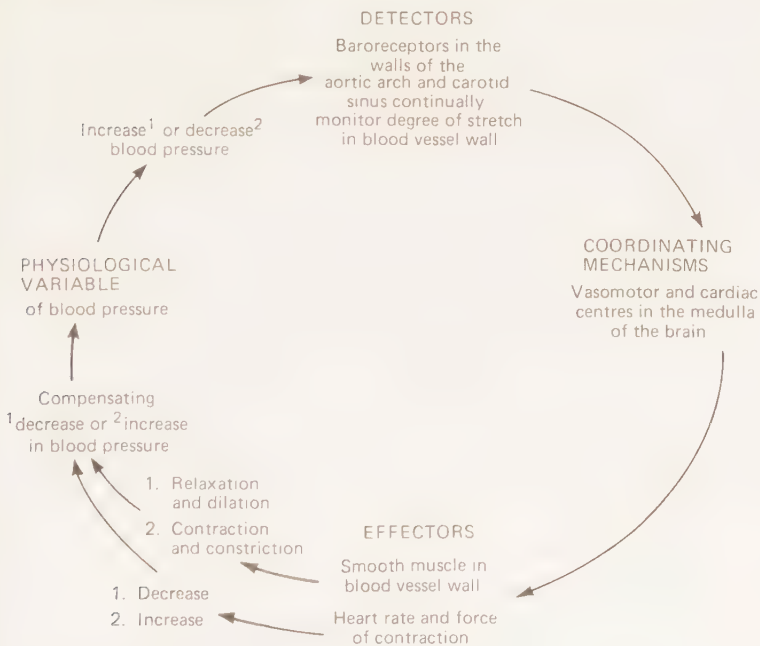


Figure 9.4 Homeostatic control of blood pressure

A framework for understanding

Homeostatic mechanisms make up a large part of the subject matter of physiology and form an excellent framework for organizing, understanding and remembering it. In addition, a breakdown of homeostasis, in whatever form, inevitably leads to health problems. It follows that many if not all a person's health problems may be understood from a basis of understanding homeostatic mechanisms and the factors which affect them. In other words, health problems

can usually be seen in terms of a breakdown of an individual's successful adaptation to his environment. These ideas are central to a nurse's understanding of relationships in laws of health. I agree with Henderson (1966) that a definition of nursing should convey an appreciation of this principle of physiological balance.

Basic physiological needs

Below are listed the basic physiological needs of every human being. In health, each one of these is kept in homeostatic balance.

1. To maintain adequate nutrient and oxygen intake and supply to the tissues
2. To eliminate waste products and toxic substances
3. To maintain normal water balance, electrolyte and hydrogen ion concentration (this is largely dependent on satisfactory fulfilment of 1 and 2)
4. To maintain body temperature within the normal range
5. To maintain intact defence mechanisms
6. To rest and to sleep
7. To move and to maintain normal posture.

A supplementary physiological requirement which, although not essential for an individual's survival is certainly essential for the survival of the human species, is the need to reproduce.

The fulfilment of all these needs is dependent upon the normal activity of the cells which directly perform these functions, but also upon the normal activity of cells of the coordinating and integrating systems which 'link up' homeostatic mechanisms, so that there are underlying 'needs' for the following:

1. Integrity of the circulatory system
2. Integrity of the nervous system
3. Integrity of the endocrine system.

If any one part of these systems is malfunctioning, this can potentially affect any number of the basic physiological requirements for normal function.

Health problems

If one considers the physical problems that nurses may, and commonly do, encounter in their patients, then these can clearly be seen as resulting from a breakdown in one or more of these basic physiological requirements.

Examples illustrating this point are as numerous as the physical

problems that occur. In order to illustrate the nursing need for a knowledge of structure and function, let us consider one health problem which is fairly commonly encountered.

If the need for an adequate intake and supply of oxygen to the tissues is not met, a person will become hypoxic. A major problem associated with this condition is breathlessness, because the individual will reflexly increase the rate and depth of his respiration in an attempt to compensate the hypoxia and restore homeostasis. In order to assess a breathless person's need, to plan and give care and to evaluate the effectiveness of that care, a nurse requires an understanding of the normal process of respiration and the factors which may affect it.

There are many causes of hypoxia, because the process of respiration can be disrupted at a variety of points and by a number of agents (*Table 9.1*).

The nurse should also appreciate that hypoxia often occurs in conjunction with hypercapnia (increased partial pressure of carbon dioxide in the blood) and hence non-fulfilment of the physiological need to eliminate waste products. Since carbon dioxide forms carbonic acid in solution in the blood, its presence in excess leads to an increase in the acidity of the blood and body fluids (respiratory acidosis). This results in non-fulfilment of the need to maintain hydrogen ion concentration within a normal range. Hypercapnia and increased acidity of the blood also stimulate increased respiratory effort. This clearly illustrates the integrated nature of body function.

Knowledge and understanding

The following are examples of how such knowledge may be applied with understanding.

1. When assessing needs and evaluating the effectiveness of care:
 - (a) Respiratory effort—assessment of the extent of deviation from the normal range in terms of rate and depth of respiration and energy expenditure.
 - (b) Hypoxia
 - (i) Assessment of degree of hypoxia by colour of skin and mucous membranes because, if 5g/decilitre of the haemoglobin content of blood is deoxygenated, cyanosis (blue colouration) will be apparent
 - (ii) assessment of the extent of the metabolic consequences of hypoxia in terms of generalized fatigue, state of the peripheral tissues and level of consciousness.

Table 9.1 Causes of hypoxia

<i>Point at which disruption of respiration occurs</i>	<i>Cause of hypoxia</i>	<i>Examples of conditions</i>
Atmosphere	Decreased partial pressure of oxygen in the external atmosphere	Exposure to altitude or other environment e.g. smoke-filled room, in which the partial pressure of oxygen is low
Mechanics of transporting oxygen from the atmosphere to the alveoli	Obstruction of the airways	Foreign bodies Mucus in bronchi and bronchioles e.g. chronic bronchitis Spasm of smooth muscle of bronchioles e.g. asthma
	Increase in the volume of the potential space between the pleura	Pleural effusion Pneumothorax
	Paralysis of the respiratory muscles	Myasthenia gravis Myopathies
	Damage to the nerves supplying the respiratory muscles	Poliomyelitis Neuropathies
	Damage to the bony support of the thorax, leading to pain on movement	Fractured ribs
Control mechanisms	Damage to the respiratory centre in the pons and medulla of the brain	Trauma Tumour
Diffusion of oxygen in the alveoli to the blood in the pulmonary capillaries	Increase in barrier to diffusion	Pulmonary oedema Absence of surfactant in neonates
Carriage of oxygen in the blood to the tissues	Inadequate pulmonary perfusion	Pulmonary stenosis Right ventricular failure
	Inadequate haemoglobin content of erythrocytes	Anaemia
	Stasis of the systemic circulation	Left ventricular failure Haemorrhage
Diffusion of oxygen from the blood to the tissues	Increase in barrier to diffusion	Oedema
Utilization of oxygen by the tissues	Inability of cells to utilize oxygen	Cyanide poisoning

2. Planning and giving care:

- (a) Positioning the patient—when lying down, the contents of the abdominal cavity press against the diaphragm and push it up into the thoracic cavity. When sitting up, this does not occur, because of the effects of gravity. As a result, tidal volume (the volume of air inspired or expired with each breath) and alveolar ventilation (the volume of air reaching the alveoli per minute) are likely to increase, as is the efficiency of respiration. Therefore the breathless patient may well be helped by assuming a supported, sitting position.
- (b) Hypoxia leads to malfunction of tissues. Peripheral tissues will be more susceptible to factors such as pressure and infection and the patient will need appropriate help to combat these.
- (c) Hypoxia and the resultant breathlessness leads to generalized fatigue and are exacerbated by increased energy demand. This means that the patient requires rest; nursing care should be directed towards ensuring this. However it also further illustrates the integrated nature of body function, in that physical rest implies immobility, and immobility constitutes non-fulfilment of the basic need to move and is thus a problem in itself. The nurse must be aware of this and should include, in the planning and execution of her care, measures to combat the risks associated with this problem.
- (d) Increased respiratory effort may lead to dehydration (non-fulfilment of the need to maintain normal water balance); because of decreased intake of water (attributable to the degree of prostration) increased loss (because expired air is saturated with water vapour) and the increased muscular effort which raises body temperature and causes sweating. Therefore, nursing care should include attention to the patient's fluid balance.
- (e) The aims and possible side-effects of medical treatment must also be understood, if the nurse is involved in its implementation. For example, oxygen therapy is often ordered for the breathless patient. The aim of this is to raise the partial pressure of oxygen in the blood to relieve breathlessness and to improve oxygen supply to the tissues. However, high concentrations of oxygen may irritate mucous membranes and, for some patients, particularly those with chronic obstructive airways

disease, may precipitate respiratory failure and death. This is because such patients may have become tolerant of a higher than normal partial pressure of carbon dioxide in their arterial blood (carbon dioxide concentration and the closely linked hydrogen ion concentration of blood constitute the normal stimulus to breathe). If the hypercapnic drive to breathe is removed, due to tolerance, such patients breathe in response to hypoxic drive. If hypoxia is relieved by giving high concentrations of oxygen, the patient will stop breathing. Such patients must be given only relatively low concentrations of oxygen (approximately 24 per cent) for this reason. They must also be monitored carefully while receiving oxygen therapy.

Observation and communication. The skills of observation and communication are prerequisites to the application of such scientific knowledge. Accurate observation of the individual, and interpretation of that observation, requires skill. The nurse does not work in isolation and in order to obtain accurate information efficiently, on which she can act, she must be able to communicate effectively with others—the patient, his relatives and other members of the health care team such as doctors, physiotherapists and social workers, as well as other nurses. The importance of the acquisition of these and other skills cannot be overemphasized.

Some of the applications of structure and function in the nursing care of a breathless individual have been illustrated above. In a more general context, though, it is possible through observation of nurses at work to develop views and to make suggestions regarding how and when nurses use their knowledge of biological sciences.

Need for biological information

There is unfortunately a dearth of research-based information on this subject. Dr Kathleen Wilson (1976), in a paper entitled 'Does a knowledge of biological sciences fit an individual for the activity of nursing?', gave some examples of situations in which knowledge of the biological sciences is used by nurses at ward-sister, charge-nurse, staff-nurse and enrolled-nurse levels.

1. To prevent doing injury to patients, for example by using a safe injection site, preventing the development of pressure sores sores
2. To understand the patient's condition, the complications

which may arise, and the aims and possible side-effects of medical treatment; for example the side-effects of stabilization of patients on drugs such as hypotensives, digoxin or insulin; or the falling blood pressure and rising pulse rate of a patient after surgery

3. To teach patients or clients to care for themselves: for example antenatal care; the need for immunization; the relationship between diet, insulin and lifestyle for the diabetic.
4. To understand the significance of information she receives, either by her own observation or that reported by other staff, the patient or his relatives or friends: for example when an unconscious patient responds to being spoken to. By using such information the nurse starts nursing care and enables other members of the health care team to contribute to patient care.
5. To teach other staff, learners, auxiliaries, domestics, for example doctors, dieticians, district nurses, in relation to the above, to ensure that they recognize the significance of observations and report them.

Limits of knowledge recognized

In my view, the nurse needs biological scientific knowledge for two further reasons. First, to satisfy her personal intellectual requirement for understanding the reasons underlying her activities. This intellectual need is likely to vary from person to person and should be fostered by education. Secondly, to be aware of the limits of her knowledge. No one person can be completely knowledgeable, now that there are so many biological, medical and nursing specialties, and it is therefore essential that the nurse should know her limitations and be aware of when it is necessary to search for further information and understanding, either from library sources or by reference to others. I think that an individual requires *some* knowledge in order to recognize when they do not have enough. Lack of awareness of an insufficiency of biological knowledge could lead to harm being done to patients.

It is interesting to attempt to identify the degree of biological knowledge required for the performance of various nursing activities. In a recent paper, Akinsanya and Hayward (1980) have defined four levels of nursing activity, reflecting the progressive depths of biological knowledge required. These are:

1. Task-Operational (TO) level
Activities performed usually by the untrained (auxiliaries, aides, orderlies), and which do not require a specified level of

- depth of knowledge of biological science; for example non-nursing duties such as cleaning lockers, or assisting nurses in routine care
2. **Task-specific (TS) level**
Activities which require an understanding of basic biological ideas. Student and pupil nurses should be equally proficient; for example observation of general well-being of patients, reporting accurately, taking and recording temperature and blood pressure
 3. **Task-contextual (TC) level**
Activities involving decision-making, for which the depth of knowledge of biological sciences becomes detailed, all-embracing, and crucial to patient safety. Shared by student and pupil nurses, but the latter concentrate almost exclusively on practical applications, for example drug administration, initiating nursing care, assisting with medical and surgical procedures
 4. **Professional and personal development (PPD) level**
Knowledge of the biological sciences should be commensurate with wide-ranging responsibilities of the newly enrolled or registered nurse.

Identification of the precise biological knowledge on which the safe practice of such nursing activities rests, will be a difficult and challenging research task. The results of such research could, for the first time, lay down specific guidelines for the biological content of various nursing courses.

Relationships with nursing practice

At present the nursing profession lacks confidence in the nature and extent of its scientific foundations (WHO, 1956). The necessity for a biological foundation is accepted, as is the claim that the individual disciplines should not be taught to nurses as ends in themselves, but in such a way as to inform and direct their work (Beck, 1958). Similarly, there is a need to identify the relationship between the quality of care given and nursing knowledge of biological science. 'Quality' means degree of excellence and therefore implies skill in the application of biological knowledge to patient care.

Technical skill, and skill in making informed observation and in reporting, are different accomplishments. It is around this difference that much of the controversy and confusion about nursing education revolves. Technical skill means manual dexterity which individuals can acquire, with practice, once they have been

shown how to perform the task. This sort of competence does not require an understanding of the possible effects of the procedure, or of the scientific principles on which the activity is based as Wilson (1975) has pointed out. She also found that staff nurses did not show as much knowledge of the biological sciences related to nursing activities as doctors expected. In hospital, where doctors and nurses work in close association in order to provide effective patient care, the discrepancies revealed by Wilson's results could be of danger to patients. The education of a medical student provides him (or her) with an advanced level of theoretical knowledge and an opportunity to apply the scientific method to practice. A great deal of the material which is presented to him is based on research. It is therefore likely that he appreciates the never-ending nature of the search for knowledge and realizes that his education will not stop when he becomes qualified. It may be that doctors assume that nurse education has provided the nurse with similar opportunities. It could be argued, therefore, that the nurse, when attempting to define her role, should take account of other peoples' expectations of this role.

Nurses know that many nursing procedures aim to care rather than cure. These procedures do not require medical prescription and in fact, doctors are usually unaware of how they are performed.

If the nursing profession fails to study its methods in this area of care, in the light of their scientific basis, the practice of nursing runs the risk of stasis and invalidation.

Many aspects of basic nursing are steeped in tradition. Routines may be learnt by imitation and taught with little explanation of their rationale; this may be because the latter is unknown. It might be argued, 'Well, they usually work!', and this may be the case. However, if they have not been studied scientifically, how can nurses be sure that there is not a method which would produce even more satisfactory results?

A basis for understanding

The nurse has an indisputable need for knowledge derived from the biological sciences. She needs this knowledge in order to understand the logical basis of nursing care which relates to the physical needs of her patients. Much of this knowledge will have direct application to daily nursing tasks and responsibilities and it should therefore be presented in nursing education in such a way that it clearly illustrates the application of theory to practice. Anatomy and physiology, respectively, provide information about the normal structure and function of the body and are probably the two central biological

subjects contributing to nursing theory, because they provide the basis for understanding *abnormal* structure and function. Physical and mental health are closely related. Emotion, for example, can be seen in terms of a conscious interpretation of cellular responses to fluctuations in their internal environment, which have occurred as a result of stress. Study of physiology, then, can also form a basis for understanding mental function and has close links with psychological knowledge in this area.

If nurses are to function efficiently as independent but cooperative practitioners of their art, then they must also cultivate and value the questioning and analytical way of thought which comes from an understanding of scientific method and its applications in investigating and developing nursing theory and practice.

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Nutritional science applied to nursing

JEAN HAYTER

Nutritional science is the science that interprets the relationship of food to the functioning organism. Its pertinence to nursing is best seen by considering that food is a basic human need and is necessary for life. Together with oxygen, water and elimination of waste products, it is prerequisite to needs such as security, belonging, self-esteem, and self-actualization. In the presence of hunger, man will not be concerned with higher needs such as security. He may steal or even kill for food. Man has used ingenious ways to survive in the absence of food. For example, the writer has personal knowledge of a situation in Holland during the Second World War, during which residents survived for weeks on nothing but tulip-bulb soup.

A person can survive longer without food than without oxygen or water. A general guideline is that it is possible to survive for only about 5 minutes without oxygen, 5 days without water, and 5 weeks without food. Oxygen is not stored in the body; water which is stored in the body is not available for use in physiological processes or to restore losses; but food is stored in the form of body tissue, which can be broken down for energy if necessary. As with all mechanisms designed to maintain dynamic equilibrium, however, there are limits beyond which the body cannot adapt, and health is threatened by either an excess or a deficit of food.

Unlike many adaptive mechanisms, regulation of food intake in relation to need is far from perfect. Habit, psychosociological and cultural factors affect nutritional intake more than true physiological hunger. Factors such as age, sex, activity level, and numerous other variables influence the need for nutrients. Nurses must view the need for food as one among many basic human needs of holistic man and must direct their efforts toward supporting behaviours which will maintain an optimum nutritional state for their patients. This involves obtaining information about the patient's eating behaviour, assessing the adequacy of his nutritional status, determining the unique goals to be accomplished with regard to his nutrition, and planning and implementing nursing interventions designed to accomplish those goals. Finally, to

complete the nursing process, they must evaluate outcomes of nursing intervention to see if the desired goals were achieved.

First, in this chapter, an overview of nutritional needs will be given, including those essential components of an adequate diet. Next, various factors which affect nutritional needs will be explored, followed by sections on the psychosociocultural and physiological aspects of nutrition. Nursing assessment for nutritional needs will be described, and, finally, the current major nutritional concerns will be discussed.

Overview of nutritional needs

Nutrients essential for human consumption are those carbon compounds, vitamins and minerals, which the body is unable to manufacture and which are necessary for essential body functions. Man must obtain these substances performed from the environment in sufficient quantities to develop and maintain body tissues and to maintain the metabolic reactions that sustain life. Plants can make all 20 amino acids found in their proteins, but humans must rely on their diet to supply about half of their amino acids. At least 45 compounds or elements are essential for human life (Scrimshaw and Young, 1976). In addition, there must be sufficient caloric intake to meet the body's energy needs. All essential nutrients are available through food. No one food by itself has all essential nutrients, but all of them can be obtained from intake of a well-balanced, varied diet.

Protein

Protein is needed for tissue growth and maintenance. Nine amino acids are essential for humans (Mitchell *et al.*, 1976). An individual is in positive nitrogen balance if the nitrogen intake from protein is approximately equal to the nitrogen lost in the urine and faeces. If sufficient amounts of the essential amino acids are consumed, and if no adverse circumstances exist, the person will be in nitrogen balance. If a single essential amino acid is absent from the diet, negative nitrogen balance results, because the tissues requiring that particular amino acid cannot be maintained, are broken down, and their nitrogen is excreted. Although the quality of the protein affects the amounts that are needed, in general it can be said that an amount of protein equivalent to 0.8 g/kg ideal body weight for adults is sufficient if a mixed protein intake is consumed. More protein is needed during the growth years (Robinson, 1975). It is desirable that at least one-third of the daily protein intake should be from animal sources.

Fat

Fat is needed for its satiety value, the fat-soluble vitamins and essential fatty acids it contains, and to supply part of the caloric needs. Fats are the most concentrated sources of energy. One gram of fat yields 9 cal (≈ 37.8 J) compared with 4 cal/g (16.8 J/g) for protein and carbohydrate (Robinson, 1975). To explain why alcoholics do not wish to eat, even though numerous essential nutrients are missing from their diet, one need only remember that alcohol supplies 7 cal/g (29.4 J/g) (Groer and Shekleton, 1979). The Committee on Dietary Allowances of the Food and Nutrition Board recommends that no more than 30 per cent of caloric needs should be supplied by fat. They also recommend that less than 10 per cent of total calories should come from saturated fatty acids and up to 10 per cent from polyunsaturated fatty acids (Peterkin, Kerr and Shore, 1978). Although it is difficult to obtain accurate information about fat intake because of the variety of foods eaten and the various ways in which they are prepared, it seems likely that the average American diet exceeds those amounts.

Carbohydrate

Carbohydrate is the major source of energy for most people, and is the cheapest and most easily digested form of human energy. It is important that sufficient carbohydrates should be eaten to spare protein for its unique functions, rather than using protein to satisfy energy needs. Brain, nerve and lung tissue require glucose as their source of energy but, as will be discussed later, it is possible for the body to convert fat and protein to glucose under certain conditions. In general, carbohydrates should supply about 58 per cent of the caloric needs (Peterkin, Kerr and Shore, 1978).

Carbohydrates provide many essential minerals, vitamins and fibre. It is beyond the scope of this chapter to discuss all essential vitamins and minerals, but in the absence of excess need, or problems which would interfere with absorption or utilization, the person who eats an adequate and varied diet is unlikely to have vitamin or mineral deficiencies.

Harmful results may ensue from excess intake of some vitamins and minerals. Even if there are no harmful effects from a specific vitamin or mineral (and no evidence exists at this time to say that excess amounts of all such substances produce toxicity) excretion of the excess places an undue workload on the kidneys. If the kidneys are in optimal condition, perhaps no harm will come of this, but if kidney function is somewhat impaired, that could be enough to push the person over into renal failure.

Fibre

Plant materials which are indigestible are called fibre. Fibre promotes softer stools, more frequent elimination, and possibly enhances the excretion of bile acids, sterols, and fat. It prevents absorption of some vitamins, minerals, and other nutrients, as well. Fibre has been said to relieve or prevent diverticular disease and to decrease the incidence of cancer of the colon.

Without question, fibre is an essential dietary ingredient and everyone should have some in his diet. Some caution should be expressed with regard to the current emphasis on increasing dietary fibre, however. The impression is sometimes given that refinement of food and change in dietary habits has resulted in a greatly reduced fibre intake. Actually, from 1913 to 1965 the daily crude fibre content of the average American diet decreased only approximately 2 g—from about 7 g to about 5 g—and the daily fibre content of the average British diet increased from 3.6 g to 4.2 g during that period (Heller and Hackler, 1978). It is true that some African diets contain 25 g of fibre—but there is no evidence at this time to justify increasing the fibre content of the British or American diet to that level.

Perhaps more attention should be given to the *type* of fibre, rather than merely the *amount*. Adding large amounts of fibre in the form of bran or cellulose alone may have no beneficial results. Because there is evidence that fibre interferes with absorption of vitamins, minerals, and other nutrients, deleterious effects may occur with increased fibre intake. As with other dietary questions, variety seems the best course of action in the absence of definitive evidence to the contrary. Inclusion of whole grain products, fruits, vegetables, and nuts in moderation will ensure a good mixture of fibrous constituents. Any statement about the use of dietary fibre to cure specific diseases should be looked upon with reservations.

The effect of age and other variables on nutrition

Throughout life, everyone needs the same nutrients, but the amounts vary according to age, sex, activity, body size, and state of health. Nutritional needs of children increase gradually as they grow. Growth occurs in spurts, and there is individual variation, so nutritional needs are greater at some times than at others. Growth spurts for girls occur from 10.5 to 13 years of age and for boys from 13 to 16 years (Mitchell *et al.*, 1976). Girls may need an iron supplement when menses begin. They should be advised to eat foods rich in iron at that time.

Adolescence is a time when there is a great need for independence. Food served or consumed by their parents may be rejected by adolescents in an attempt to establish themselves as independent personalities. The tremendous need for peer approval, the prevalence of food fads, and high intake of snack foods may result in an inadequate diet. Some snack foods are nutritious, but careful selection is necessary. Rather than engage in futile attempts to discourage snacks, the nurse should encourage adolescents to select milk or fruit juice instead of a soft drink, and cole slaw or lettuce and tomato instead of potato crisps. This will supply important nutrients, while reducing the overall fat and caloric intake.

Adolescence is a difficult period for a person who must have a modified diet. With advice about proper food selection, the adolescent can eat out with his peers and, at the same time, follow his dietary prescription in most instances. If the dietary modification is very restrictive, the young person can be advised to save food exchanges for those times he wishes to eat out, or to take food such as fresh fruit with him.

Adolescent boys have a good nutritional intake compared with that of girls. Their rapid physical growth and physical activity stimulate their appetite and result in high caloric intakes. Teenage girls comprise one of the most poorly nourished groups. Concern about their increasing size, and increasing maturity compared with that of boys in their age group, cause them to curtail their food intake drastically. This is of particular concern in view of the fact that many girls become pregnant during adolescence and face additional nutritional demands associated with pregnancy. No great harm results from the adolescent girl's overwhelming desire to avoid weight gain, if all essential nutrients are included in her diet, so *that* should be the major emphasis of teaching.

As age advances, there is a tendency to decrease activity but maintain caloric intake at the same level, resulting in weight gain with advancing age. An intake of 3500 cal (147 kJ) in excess of need results in 1 lb (0.45 kg) weight gain (Wilmore, 1977). Intake that exceeds expenditure by 100 cal/d (420 J/d) will result in a weight gain of 10 lb (4.5 kg) in a year. That could be as little as one cake, one cup of dry cereal or one tablespoonful of peanut butter more than needed each day. A good way to lose weight, or to prevent weight gain as energy expenditure decreases, is slightly to decrease the size of servings.

Physical activity affects nutritional requirements. Using the guiding principle that caloric intake should equal energy expenditure, caloric needs should be increased proportionately with physical activity. The nutritional requirements are greater for a

person of large body-build than for a person whose frame is small.

The form of a nutrient in food may have a significant effect on its absorption and utilization. For example, iron from vegetable sources is absorbed to a much smaller extent than iron from animal sources. The presence or absence of one nutrient may affect the utilization of another. Comparatively little is known about this aspect of nutrition, because most studies have been of a single nutrient at a time, but some information exists. Iron is absorbed less efficiently when ingested with green leafy vegetables and whole-grain, unleavened bread, but vitamin C and small amounts of red meat markedly improve overall iron absorption (Scrimshaw and Young, 1976). This is a point well worth heeding, when we remember that nurses frequently advise patients to take iron tablets with meals to reduce gastric irritation. Most iron tablets are enteric-coated, but if gastric distress is a problem, patients should be advised that the type of food eaten with iron ingestion greatly affects its absorption. In addition, protein deficiency can result in signs of vitamin A deficiency, even though vitamin A intake may be ample (Scrimshaw and Young, 1976).

Stress

Nutritional status affects adaptation to stress, and stress may change nutritional requirements. The adrenal response to stress is different with different types of stress and in different individuals. Two fractions of the adrenal cortex secretion are important. Mineralocorticoids act primarily by conserving sodium and water, while glucocorticoids enhance gluconeogenesis—glucose formation from protein and fat. Increased secretion of adrenal cortex hormones, whether induced by disease or environmental stress, is accompanied by a need for increased calories, proteins and a number of vitamins and minerals (Dairy Council Digest, 1971).

Caloric needs are increased in cold temperatures and in extremely hot temperatures. Even if the individual is protected from exposure to the cold, a 2-5 per cent increase in caloric needs is recommended for the energy needed to carry cold-weather clothing. Adipose tissue insulates and, therefore, an obese person's caloric expenditure is less affected by cold than is that of a thin person. Caloric needs are also increased by exposure to high temperatures. This is attributable mostly to increased heat loss, which results from heat transport through the skin—one of the body's mechanisms for maintaining a stable body temperature. Caloric intake should be increased by at least 0.5 per cent for every degree of environmental temperature rise over 86° F (30°C) (Dairy Council Digest 1971). Caloric needs are

increased 7 per cent for every 1°F increase in body temperature (Mitchell *et al.*, 1976). Nevertheless, an increased body temperature causes anorexia.

Psychosociocultural aspects

Animals and very young children choose a reasonably good diet when given a wide selection, but humans do not choose on the basis of nutritional need after early childhood. Food intake is influenced by a complex set of needs designed to achieve such satisfactions as pleasure, social acceptance, security, companionship, status and enhancement of ego. Food is associated with gratifying sensations such as comfort, companionship, belonging, warmth, friendliness and motherliness. The infant learns at an early age to associate warmth and cuddling, safety and security, with food. He also rapidly learns to express his feelings through rejection or acceptance of food. If food is used as a reward, or if the child is made to feel that others approve of him for eating or not eating, he may learn to use eating behaviour as a way to manipulate others, and such behaviour may be retained by the adult. The use of certain foods as rewards, for example, telling a child he can have a dessert if he eats his vegetables, may inadvertently teach the child to think of the reward foods as 'good' and others as 'bad'. For some people in such diverse situations as prisons, hospitals, political upheavals or unhappy home situations, refusal to eat may be seen as the only way in which they can exert control over the situation.

People respond to external clues of sight, smell, and taste, as well as to true feelings of hunger. Expressions such as 'I can't stomach that', 'That is hard to swallow', and 'It gives me a lump in my throat', illustrate the connection between emotions and the gastrointestinal tract. Other reactions, although explicable on a physiological basis, nevertheless show the connection between eating behaviour and emotions, for example, the anorexia that precedes an examination.

Children usually adopt the food preferences of adults around them. They even switch from 'like' to 'dislike' of a specific food, if they are moved from one person to another with different food tastes. Food preference is largely based on previous experiences. When a child starts to go to school, he sees different foods, compares them with his own, learns more about the meaning of food, and forms many attitudes. Food patterns are developed early and are usually well established and very stable by adulthood. Good food habits should therefore be taught at an early age, and the school nurse is in a good position to do this.

Food has been pertinent to the development of the human race since the beginning of recorded history. Food, so essential for survival, provided the incentive for socialized behavior. One of the most pressing problems has always been to secure sufficient food, and the presence or absence of food has often been the determining factor in the outcome of wars. Food habits are closely associated with social functions and religious practices. Eating together is looked upon as symbolizing friendliness and interpersonal acceptance the world over. In every culture and society, when meetings are held for pleasure, food is served.

Attitudes

People develop attitudes regarding certain foods. A given food has different meanings in different places; for example in America milk is a basic food but it is rejected in some countries. Bread is the main food in Greece but it is unknown in some other countries. Meat and bread carry masculine meanings, while fruits and vegetables have a feminine connotation. Shrimps, coffee, olives, and gourmet dishes are considered to be adult foods. The lower the educational level, the more likely it is that the person will scorn fruits and vegetables (Williams, 1973). Some foods are associated with high status, some with low status. Advertisers capitalize on these feelings by associating their product with high status or something 'desirable'. Some advertisements shame the homemaker for depriving her family of 'real butter', and some praise her for looking after her family by serving fancy desserts. The manufacturer may appeal to small children by enclosing a toy or prize in the package. Advertisers may show a person of high status eating their product, or may associate their product with an appealing age group. A good example of the latter is Pepsi-Cola's advertisements, which depict it as the drink for young people. Business meetings and most work situations promote snacking, frequently encouraging foods containing *empty* calories (i.e. not contributing significantly to nutrient intake) by having only those foods readily available.

Culturally determined values, attitudes and beliefs shape food habits. Each culture has standardized practices which are unique to that culture and developed within the context of the culture. Culture determines what will be recognized as food, when we should have an appetite, and for what we should be hungry. In certain cultures a given food may be rejected, while in others it is accepted without question. For example, blood pudding is eaten in some cultures but all blood products are rejected in some others.

Some cultural beliefs ban the use of meat products, or of certain kinds of meat. While it is probably possible to obtain an adequate

diet from non-animal sources, to do so requires considerable knowledge of nutrition and careful attention to all essential nutrients. Plant proteins usually contain inadequate amounts of one or more essential amino acids, but it is interesting to note that different cultures have adopted certain food combinations which complement each other by pairing foods in which one supplies amino acids absent in the other, e.g., bread and cheese, beans and rice, or cereal and milk. An individual may actually starve before he will eat unfamiliar food. A good example of this occurred when the United States sent flour to India during a famine. Although the Indians were given instructions for preparing this unfamiliar food, hundreds of people died while the flour lay unused. In some cultures plumpness is considered desirable, while in others thinness is aspired to. Meal patterns differ in different countries.

Culturally different food practices, which vary markedly from each other, may all supply nutritionally adequate diets. It is best to try to bring about changes that are in keeping with the established food habits of the people and acceptable within their value system. I knew a patient who had had a myocardial infarction and who was not allowed out of bed. I noticed that the patient did not eat when food was served to him and I asked him the reason. He replied that he associated eating while lying down, with laziness, and asserted that if he saw an employee lie down when they stopped for lunch, he automatically fired him.

Clearly, the regulation of food intake is very complex and not completely understood. Whether she is discussing normal nutrition or the modification of diet for therapeutic purposes, the nurse must remember that the patient will not comply with a recommended food pattern unless all those factors which influence food behaviour are taken into account.

Changing food habits

As food habits are learned, they can be changed. Food habits are very recalcitrant to change, however, and there is frequently no need to attempt to change them. Nurses should help patients to adapt their eating habits to their special needs, rather than encourage them to change eating habits drastically. Remembering that eating behaviours serve other needs in addition to nutritional ones, and that many population groups throughout the world have thrived on a great variety of foods, it would seem desirable to work with persons so that they need only modify their eating in ways necessary for their health and well-being. Not only is it more likely that they will comply

with that teaching, but the other needs served by food intake will also continue to be met.

If someone is ill, he is much more likely to want familiar foods, cooked in the accustomed way, yet that is the time he is least likely to have them. There is always some regression with illness. The hospital environment not only deprives the patient of familiar foods, but it encourages regression. It removes the patient's control over what, when, and where he eats. Few Americans eat in bed, or in the room where they sleep, yet in most hospitals, even ambulatory patients must do that. With currently available methods, entire meals compatible with almost any sociocultural preference can be prepared, frozen, and transported for long distances. Considering the value from a psychological point of view, it seems desirable for hospitals to attempt to provide food compatible with the person's usual food preferences if he does not like the food normally served.

Consideration of the various psychosociocultural factors involved in eating behaviour, and the unique needs and attributes of the individual himself, is essential if nutritional needs are to be met. The goal must be to help people to change their eating behaviour in order to meet their own health needs, rather than attempting to alter food practices markedly, or merely giving information about nutritional needs.

Physiological aspects

As a physiological process, nutrition includes ingestion, digestion, absorption, metabolism, and the elimination of waste products of those processes. Physiological hunger is controlled by the hypothalamus. The hunger centre is situated in the lateral hypothalamus, and the satiety centre in the medial hypothalamus. Because of the numerous psychosocial and cultural influences on eating behaviour, discussed previously, people generally take in food before they experience physiological hunger. Distention of the gastrointestinal tract reduces hunger. Chewing, salivating, tasting, and swallowing also seem to reduce hunger. This helps to explain why intravenous fluids do not satisfy hunger. People tend to become hungry at the time when they usually eat—and they crave the foods they usually eat at that time. For example, some people want sweet rolls and coffee for breakfast, while others prefer bacon and eggs, fried chicken and hot biscuits, or ham and grits.

The salivary secretion starts digestion in the mouth. Digestion continues in the stomach, where hydrochloric acid and pepsin are secreted. The proximal portion of the small intestine is important for the absorption of fat, protein, and carbohydrate and for digestion to

continue. In the distal portion of the small intestine, water, electrolytes, vitamins and bile acids are absorbed. Factors which accelerate the rate of digestion are hunger, mild exercise, and lying on the right side. Factors retarding the rate of digestion are strong emotions, vigorous exercise, and pain. Motility of the intestine can be stopped, slowed, or increased by an abnormality of the neural regulatory mechanism or by interference with blood supply to the intestine.

Metabolism works like an assembly line. Substances pass from one point to the next, with changes or additions made at each stop. If there is a block somewhere, substances pile up, excesses spill over into the blood and urine, or are broken down by alternative methods so that new substances are formed. Intricate biochemical mechanisms regulate the availability of nutrients to the cells and make possible the adjustment to wide ranges of intakes. Excess nutrients taken in are handled by catabolic mechanisms, which bring about their breakdown and excretion in urine, faeces and other body secretions, or their storage in the body. In certain disorders the body is unable to break down and/or excrete some substances and, unless they are eliminated from the diet, serious problems result. Examples of such disorders are phenylketonuria, hypervitaminosis, and haemochromatosis.

If the intake of an essential nutrient is lower than that required to meet cellular needs, changes occur which act to conserve the limited supply. More effective absorption may occur, or biochemical mechanisms may be triggered, which enhance the retention of the substance in the body. As with all biological mechanisms, there are limits beyond which adaptation cannot occur. Certain deficiency diseases, such as vitamin deficiencies and kwashiorkor, have been well documented and present major problems in underdeveloped countries. Slightly inadequate amounts of an essential nutrient may go unrecognized for long periods and may, in fact, never be identified. It is these marginal deficiencies which cause concern in developed countries.

Anxiety and stress alter protein requirements. Any infection of the gastrointestinal (GI) tract causes many nutrients, especially protein, to be less well absorbed. The GI tract is under the control of, and influenced by, the autonomic nervous system. Stimulation of the sympathetic division decreases activity of the GI tract, while stimulation of the parasympathetic division increases activity. This helps to explain why a person who is anxious or frightened may not want to eat, and why, if he does eat, he may not digest the food. It is desirable for food intake during periods of stress to be limited to liquids or a very light diet.

Nutritional assessment

Nutritional assessment should be part of every nursing assessment. Depending on the circumstances, and use to be made of the data, it may be fairly brief or very detailed. Usually four separate aspects of nutritional status should be assessed: the adequacy of nutritional intake; observations of the patient's nutritional status; the meaning of food to the individual; and any special nutritional problems suspected. Part of this information is obtained by questioning the patient and part by observation.

The patient should be asked to describe his usual food intake, indicating the kinds and amounts of food and the times at which it is eaten. I have found the 24-hour recall to be helpful, despite problems of inadequate recall, deliberate faking, and the interviewing skill required. It helps to encourage the person to enumerate how many times he had eaten something during the previous 24 hours. The nurse should guard against asking questions such as 'What did you have for breakfast?', because that suggests that he *should* have eaten breakfast, and reduces the likelihood of an honest answer. Asking such questions as 'What time did you get up? What was the first time you ate anything and what did you eat? What was the next thing you ate?', helps the patient to remember, and avoids suggesting responses to the questions. If the patient does not mention eating between meals, he should be questioned about it. One study revealed that 23 per cent of the day's total calories were consumed between meals (Thomas and Call, 1971). A question which should always be included is 'Was yesterday a fairly typical day as far as eating is concerned? If not, how did it differ?'

It is helpful to have food measures or food models available when assessing, to help the patient estimate the amounts eaten. One drawback to food models is that they are frequently not like the food the patient eats and may suggest that he should be eating food such as that shown by the models.

Adequacy of diet

Two standards have been developed to assist in evaluating the adequacy of a diet: Recommended Daily Allowances (RDAs), and basic four food groups. RDAs are defined by the Food and Nutrition Board of the National Research Council in the United States and by similar bodies in other countries. RDAs are amounts decided upon as sufficient to meet the needs of practically everyone. They are not ideal amounts, and failure to meet them does not constitute an automatic deficiency. They are intended to be used only as a guide

and with reasonably healthy, normal people who have no unique needs. Illness, or deviation from normal growth and development patterns, would affect nutritional needs. Another shortcoming is that individuals differ from each other and no norms apply equally to all individuals. The basic four food groups, used by diabetics to plan their meals, serve well as a guide to assessing the adequacy of a person's food intake. As they are so widely available, and generally familiar to health personnel, they constitute a convenient standard.

The nurse notes the weight, height, and age of the patient, and also obtains a skin-fold measurement. A fold of skin and subcutaneous tissue is pulled away from the muscle mass midway between the shoulder and elbow in the triceps area, and the thickness of the skin fold is measured, preferably with calipers. Tables of normal values are found in numerous nutrition books. Because young people tend to have more lean body-mass than older subjects, there is a tendency to underestimate the amount of obesity in the elderly and overestimate it in younger people. It is desirable to lose weight slowly after the age of 30 years, because lean body-mass decreases after that age. The more common occurrence is weight gain with advancing age.

Nutritional status

Indications of good nutritional status, which the nurse would observe, are: shiny hair which is not easily plucked; uniform skin colour; absence of swelling, rashes, or other lesions; firm skin; bright, clear eyes, with no prominent blood vessels and no sores or cracks at the corners of the eyelids; rosy lips and mucous membranes, with no fissures at the corners of the mouth; smooth, pink, flexible nails; and firm, pink gums which show no evidence of bleeding.

Remembering that many things, in addition to hunger, may encourage the patient to eat, the meaning of food to the patient must be assessed. If eating is the person's only pleasure, he is not likely to decrease his intake unless his other needs can be met in some way. If eating provides security, or a feeling of being loved, or if the person eats to enhance the self-esteem of the person who prepares the food, it is important to know that those needs must be met in other ways if his eating behaviour is to change. If the only foods he enjoys are sweet or highly spiced foods, because of diminished taste sensation due to ageing, that must be taken into account. If the person is present-orientated or has difficulty in keeping enough food for survival, he will not be receptive to teaching about preventive measures. If a mother is advised to wean a child early, when her

cultural practices endorse a prolonged bottle- or breast-feeding period, or if she is advised to reduce her food intake when her cultural attitudes associate plumpness with being well cared-for, no change will occur unless the problem is approached in full awareness of the cultural factors involved. If the nurse indicates disapproval of foods which differ from her own, the patient will be put on the defensive and is likely to be unwilling to share further information. Obviously, objective information must be obtained about these various factors which affect eating behaviour so that the nurse can plan with the patient in a comprehensive way, taking into account all needs related to his food intake.

The fourth and final aspect of the nursing assessment of nutritional status is that of identifying any special areas of need for that particular patient. Sometimes the nurse is told that the patient has diabetes, coronary artery disease, or some other diet-related disorder. Whether that is true or not, the nurse and patient together should decide what goals they should try to achieve.

Major nutritional concerns

Some nutritional problems are as yet unsolved and await the results of research, but many of our nutritional problems can be solved now. Malnutrition may consist of overnutrition, undernutrition, specific deficiencies or an imbalance of essential nutrients.

Obesity plagues numerous people and adds to their health problems. A general moralistic attitude prevails, with the obese being regarded as weak-willed and gluttonous, while slimness is viewed as a virtue. The problem is not as simple as that, although it can be said that obesity results from excess caloric intake over energy needs. Inactivity, brought about by labour saving devices, the automobile, the popularity of spectator sports, and increased sedentary work, has added to the problems. As socioeconomic status improves, the incidence of obesity decreases. The explanation may be that people with low incomes cannot afford high satiety foods, and rely on starchy foods to satisfy their hunger.

Obese parents often have obese children. Environmental factors, such as similar eating habits and food attitudes, increase the likelihood that this will occur. Studies show that pairs of identical twins reared in dissimilar environments had only slightly more variation in their weights than pairs of identical twins reared together (Mayer, 1973). That finding suggests that genetic factors are of paramount importance. It is a generally accepted theory that overfeeding at certain crucial ages causes hyperplasia of fat cells,

which is irreversible and predisposes to obesity throughout life. Those crucial periods are 0–2 years and 9–13 years (Salans, Cushman and Weismann, 1973). As there is a high prevalence of overfeeding of infants in both the United States and Great Britain, it is desirable to teach parents the disadvantages of providing too much food during infancy. In adults, overeating causes hypertrophy of existing fat cells, but cells can enlarge to only a limited extent.

Gorging at one huge meal results in higher glucose and free fatty acid levels than food intake which is dispersed over a longer period (Bortz, Howat and Holmes, 1969). Food eaten late in the day is more likely to result in weight gain than food intake early in the day (Halberg and Nelson, 1977). The implications for teaching are obvious.

A practical way to calculate the diet to decrease weight is to multiply the ideal body weight for the person on the basis of his age, sex, and body-build, by the number of cal/kg recommended for his activity level, and then to decrease that by 500 cal/d. A 500 cal/d deficit will cause a weight loss of 1 lb (0.45 kg) wk—a desirable rate of weight loss.

Specific deficiencies or imbalance among essential nutrients may be caused by food faddism, fake food cures, poor food selection, or improper modification of the diet for therapeutic purposes. Patients may decide to decrease food intake more than they were advised and, by so doing, may develop deficiencies. The consumption of empty calorie foods in large quantities is a major concern today and frequently results in deficiencies of nutrients. It is estimated that 30 per cent of the daily caloric intake comes from 'junk' foods (Henderson, 1972). The increasing intake of refined carbohydrate is associated with increased dental caries and obesity, and may be related to other major health problems such as cardiovascular disease. Nutrients can be lost in the process of manufacture or preparation for human consumption. To correct the problem, there is now increased use of unrefined foods, and fortification or enrichment of foods with essential vitamins and minerals. Animal products which are high in saturated fat and cholesterol continue to be consumed in large quantities, despite clear evidence that they are implicated in cardiovascular diseases. Because those diseases continue to be the major causes of death, vigorous efforts should be made to prevent them.

Under-nutrition

While undernutrition is mainly a concern in underdeveloped countries, it also exists to some extent in developed countries.

Inadequate protein intake causes interference with both humoral and cellular immunity by decreasing plasma proteins and lymphocytes. This causes increased susceptibility to infections and makes the person particularly vulnerable to all immune disorders. Undernutrition is frequently a problem of food supply. If the person fails to eat enough for other reasons, supplementation by total parenteral nutrition seems a promising way to effect weight gain.

There are many aspects of nutrition about which we are relatively ignorant and which require further research. It may be true of tissues other than fat cells that there are crucial times when cells are added, and if not added then, they never will be. Investigation of this hypothesis would be a rich field for research, and could have profound effects on health.

More information is needed about the range of human needs for various nutrients. Average RDAs may differ widely from person to person, for our current knowledge indicates that the ranges of needs are very large. The needs of a given individual may be average for some nutrients and not for others. If it were possible to determine individual needs, and to help people meet those needs for all nutrients, health would be vastly improved.

Much knowledge comes from animal studies of one nutrient at a time. The combined effects, and effects in human beings, may be quite different. Clinical evidence is needed of the effects of certain dietary patterns, rather than continuing to emphasize the effects of single dietary constituents.

Another area where research is needed, is in the area of the long-term effects of less than optimal diets. Some have speculated that life-long underfeeding would prolong life and prevent diseases which now are major causes of disability and death. Others say that marginal dietary deficiencies may be responsible for the changes we now attribute to normal ageing, and that subclinical deficiencies may have deleterious effects which are not recognized at present.

Finally, the whole area of what is optimal nutritional intake deserves study. We function now mostly on the premise that what is, is what should be. Actuary tables of heights and weights serve as guidelines for what weights should be, and other standards or norms have been developed in a similar manner.

Nutritional science is an important area of study in nursing, and nutritional status has a great deal of influence on the health of everyone. The nurse should carefully assess the nutritional status of each patient she cares for, and should plan appropriate treatment to enable him to maintain, regain, or improve his nutritional status.

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Philosophical perspectives

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The introduction of philosophical notions to the reader of a book that is concerned with the science and art of nursing may well appear to be the result of a conspiracy designed to confuse an already complex subject even further. Whatever philosophy may be, it is neither a science nor an art. It is not exclusively pursued for its own ends (as the pure sciences claim to be) nor is it necessarily 'applied' to further the ends of some other undertaking. 'Philosophy is generally regarded as perhaps the most abstruse and abstract of all subjects, far removed from the affairs of ordinary life' (Popkin and Stroll, 1969).

Nurses are currently searching for quantitative and qualitative measurements that will allow them to demonstrate objectively, by scientific methods, the effects of at least some of the activities which are categorized as 'nursing'. The 'ordinary life' or the reality of nursing has at last become an object of interest to some nurses, who feel that tradition and myth have, for far too long, been the only guides to nursing practice. The need for nurses to examine closely their own practice, and the expectation that nurses must share the responsibility of any profession to research its own processes and if necessary, to modify its practice accordingly (Inman, 1975), have been widely acknowledged and will be reaffirmed by the contributors to this book. Will the strange and abstract contemplations of nurse philosophers not slow down, divert or even inhibit those trends which encourage nurses to observe methodically, assess, plan, perform, and evaluate nursing care?

Much of this apprehension stems from the misuse of the words 'philosophy', 'philosophical', and 'philosophizing' in the nursing literature.

The abuse of philosophy

All disciplines have to acknowledge that words which describe some of their central concepts are used in a very loose and quite often

inaccurate sense in everyday speech. Physicists have a more precise definition in mind when they operate with the concepts of 'stress' or 'balance', than the person who declares after an argument with a friend that he has been put off balance, or that the quarrel has put some stress on their friendship. In everyday speech, people often confuse with little detriment to the meaning of what they are saying, the notions of potential and probability. 'It is quite possible that Jim will come for lunch', often really means that it is highly probable that he will do so. But it really matters little, because people understand perfectly well what the speaker intends to say, namely that there is a likelihood of Jim arriving home for a meal.

Similarly, it matters not that people generally may describe a person as being philosophical following a disappointment, even if what they really mean is that the person remains calm and collected, and perhaps reacts less strongly than might have been expected. However, if nurses wish to use the physiological concept of body temperature, they would be unwise to talk in terms of 'the patient's blood running cold'. Similarly, if they insisted that the only useful contribution that physiologists could make to their understanding of the patient's health status was to provide calibrated thermometers in order to measure body temperature, someone would quickly point out that vast areas of physiological knowledge were being ignored. Furthermore, the physiologist might add that it is not really his business to construct and supply thermometers of any kind.

Nevertheless, a survey of the nursing literature shows that nurses use the word 'philosophy' in just such a colloquial way and that they tend to ignore most of the philosopher's concerns (Paterson 1971; Walker 1971; Gordon and Anello, 1974). Neither is there much evidence that nurse writers and researchers understand the methods of philosophical inquiry. It might not worry a physiologist a great deal, if what his subject has to offer is not employed by all those who would benefit from doing so. He might well be expected to be annoyed, however, to see his discipline misrepresented in so narrow and careless a fashion that its contribution is reduced to that of a supplier of thermometers.

Whether or not the potential contributions of philosophy to nursing will be used by nurse theorists and researchers, may be a matter of indifference to philosophers. However they should object, justifiably, to seeing their discipline reduced to providing moral guidance in the form of rules for right behaviour, or to lists of virtues and vices (Campbell, 1975). The philosopher also has to deny that all there is to philosophy is the construction of moral codes, and he must add that this, in fact, is none of his business in any case.

It seems urgent, therefore, to attempt an explanation of what

philosophers are concerned with, and by what methods they endeavour to answer philosophical questions.

Subject, method or activity?

Almost all modern philosophers profess the lack of any succinct or even agreed definition of their subject (Lacey, 1976), and some claim that '... it is by its methods rather than its subject-matter that philosophy is to be distinguished from other arts or sciences' (Ayer, 1956). In acknowledging that the philosopher, like the scientist, the historian, the religious prophet and the artist, tries to make the world more intelligible, one may describe his activities in terms of an understanding of reality to be arrived at by specific means, and providing a specific perspective of the world and all it entails (Winch, 1958). But this definition does not convey any information that might clearly distinguish philosophical concerns from other intellectual or artistic pursuits.

It has always been one of the tasks of the philosopher to examine and test the explicit or implicit assumptions that form the bases of science, mathematics, history, education, and the social sciences (Emmett, 1968). In this sense, a 'philosophy of nursing' would analyze the concepts, notions, ideas and methods that nursing employs. It would constitute a metascience and could quite accurately be described as metanursing.

This function of philosophy, in removing the impediments to the advance of our understanding by eliminating linguistic confusion and contradictions from the realm of discourse, and by providing the informal logic for a particular undertaking, has been described as the 'underlabourer conception' of philosophy in the service of other disciplines (Winch, 1958).

Not everyone, however, is in agreement that this is the only useful function which philosophers may perform. Another possible answer is that philosophy is a subject with many branches and that it has not one, but many, objects of study. 'So, it may be said, metaphysics investigates the structure of reality, ethics the rules of human conduct, logic the canons of valid reasoning: the theory of knowledge discovers what it is in our power to know' (Ayer, 1976).

Criteria

The common thread which emerges from an examination of these various aspects of philosophical interest, is concerned primarily with criteria. 'It is concerned with the standards which govern our use of

concepts, our assessment of conduct, our methods of reasoning, our evaluation of evidence' (Ayer, 1976). It may bring to light the criteria which we are employing, adjudicate if they are found to conflict, criticize them and find better substitutes for them. There is clearly some agreement, but still difficulties remain in settling what the subject matter of philosophy may be. Even the claims by some philosophers, that philosophy is more commonly distinguished by certain methods of inquiry (Bird, 1972), are contradicted by others who maintain that '... there is no method peculiar to philosophy' (Popper, 1972).

Finally, some authors declare that neither subject matter nor method are particularly specific to philosophy, but that the activity of philosophizing, in itself, is what distinguishes philosophy from other pursuits of knowledge. Kant is often quoted in this context, to show that there is nothing new about the idea that the activity of philosophizing is more important than the subject. 'You will not learn from me philosophy, but how to philosophize, not thoughts to repeat, but how to think' (Tomlin, 1950).

So, how should one endeavour to answer the immediate question, 'What is philosophy?'

A story is told of the British philosopher, G. E. Moore, who in answer to this question would gesture towards his bookshelves and declare, 'It is what all these are about.' Reading Plato and Aristotle, Descartes and Locke, Kant and Russell, Popper and Wittgenstein would certainly illuminate the question and illustrate the kind of problems and the distinct approaches that these philosophers have examined and employed (Flew, 1979). The suggestion, that the topic of philosophy might be more usefully approached by exemplification rather than by definition, is a common one (Körner, 1969) and will be followed here, first by outlining some philosophical problems, then by explaining some philosophical methods, and finally by suggesting how nurse theorists and researchers could use the philosophical perspective in the study of nursing.

Philosophical problems

In setting down some examples of philosophical problems, an outline provided by Körner (1969) is employed here. Each of the following examples belongs to a group of closely interrelated problems which, together, form the whole, or a substantial part, of a special branch of philosophical inquiry: logic, philosophy of mathematics, philosophy of science, moral philosophy, and so on.

The first two problems involve perhaps the most abstract concepts. For a very long time these have been shared by philosophers and mathematicians. Although their immediate relevance to nursing theory may be difficult to demonstrate, their omission would have been comparable to the kind of misrepresentation that has been severely criticized earlier in this paper.

The problem of class-existence

All thinking involves explicit or implicit classifications. To say that man is an animal is to allocate him to a position in a subclass (species) of the class (genus) of animals. A class is determined by enumerating its members or by indicating a property which all, and only, its members possess. One may appreciate that systems of classes can be constructed which eventually lead to the question whether there may be one class (the highest genus) which is the class of all known entities. Similarly, could there be a class which has no members at all? The problems of class-existence therefore include questions about 'universal' and 'null' classes. Another aspect of this problem revolves around the notions of 'normal' and 'abnormal' classes. The zoologist's classes are all normal because, for example, the class of vertebrates is not a member of itself; in other words, it is not itself a vertebrate. The 'universal' class, however, would be 'abnormal' because it would contain all entities (classes) as members and consequently would include itself. Since Aristotle, the problem of class-existence has stimulated much philosophical and logomathematical thought. However, stated in this form, this problem appears to hold little promise for those other than mathematicians and logicians. However, it interrelates with a series of questions about the logic of statements, about their truth or falsity simply as statements. Attention to the logical truth of related statements should not only be the prerequisite of any scientific investigation, but would undoubtedly save a great deal of unnecessary work. The assumptions 'All nurses are women' and 'No nurse is a woman' cannot both be true, but could certainly both be false, because some nurses may be women, and some may not. Starting investigations into both the above assumptions would clearly be a waste of time, and yet similar mutually exclusive hypotheses are quite frequently formulated as the basis for a piece of research. Logical analysis of such words as 'therefore', 'so', 'consequently' and 'because', which link two statements and imply that one follows in some way from the other, exposes inconsistency and lack of validity, if the writer has not properly demonstrated the logical connection between such statements. 'Logical necessity' and 'logical consequence' must be clearly apprehended before statements (or assumptions) are used as

a basis for investigation or practice. If they are not, all that follows in the way of observation, description, explanation and action is bound to be muddled. Much of it may be completely irrelevant or, in practice, harmful.

The problem of Zeno's dichotomy

Zeno, a pre-Aristotelian Greek philosopher, supported the metaphysical view that reality is an indivisible, continuous, homogeneous and changeless whole, even if sensory experience appears to tell us otherwise. If one imagines a ball rolling along a yardstick, sensory experience leads one to describe the ball as being in motion and, in a finite period of time, to have arrived at the end of the stick. Logically, however, it would never arrive. Before the ball could reach any given point, it would always have to cover the half, and then the half of that distance, and so on without limit before it gets to the end of the stick. This division can proceed indefinitely so that it would seem that, logically, the ball could never arrive. If Zeno's argument were correct, no body could move even the smallest distance. Yet bodies obviously do move. This dichotomy between the logical analysis and sensory perception is not so far removed from many real-life experiences. The deceptiveness of perception is well documented in psychological terms, but it cannot really be explained by observation of psychological phenomena. This, as yet not very satisfactorily solved, problem raises important questions about the nature of the application of mathematics to sense-experience and, consequently, of the role of mathematics in the natural sciences.

The problem of induction

Scientists try to predict future events by generalizing from observed particular instances. The Scottish philosopher David Hume (1955) formulated this process as follows: '... I have found that such an object has always been attended with such an effect, and I foresee, that other objects, which are in appearance similar, will be attended with similar effect'. He did not doubt that almost everybody makes inductions of this kind from retrospective statements about natural phenomena to forward-looking generalizations about them. What he did argue was that there seems to be no evidence of the rules by which people make such generalizations. If the rules governing the process of induction are unknown, how can one distinguish correct from incorrect inductions? Modern science generally relies on statistical rules to adjudge a generalization to be valid or not. Having raised the problem about the relationship between logico-

mathematical conclusions and sensory evidence, one may question whether the problem of induction can be solved by statistical means alone. In any case, whatever justification of induction is required, without first explaining the conditions which a justification of induction in general or a particular kind of induction would have to fulfil, no agreement could be reached. The analysis of inductive reasoning and its justification is particularly urgent where offered generalizations are disputed and rejected by many people on largely irrational grounds.

The problem of the relationship between mental and physical phenomena

Human beings are aware of their thinking, perceiving and feeling. It is also accepted that there is a relationship between these mental and other physical phenomena. However, we are not in the same way aware of the mental processes of others. By which criteria do we come to know that the external behaviour of other beings embodies or expresses their thinking, perceiving and feeling? What is the relationship between observable behaviour and the mental processes which are inferred from it? Physiologists might, on occasion, reduce mental phenomena to physical states, while psychologists have occasionally demonstrated a reduction of physical states to mental processes. This reductionist approach would imply that neither mental nor physical phenomena have any independent existence, but are merely two aspects of a reality which is, strictly speaking, neither mental nor physical.

Alternatively, one might hold that every physical state has a parallel mental state to which it corresponds. There are a number of 'body-mind' theories, of which the above two are selected examples. The practice of medicine depends to a large extent on correlation theories and is judged by its predictive successes and failures. Nevertheless, neither medicine nor any of the natural or social sciences can offer an explanation which would answer the important question of what we can really know, or what we only assume by virtue of its practicality.

The problem of moral disagreement

Moral disagreement, or moral conflict, cannot be solved by appellation to a scientific judgment of truth or error. When two people disagree about the date of an event, they can check who is right and who is wrong by consulting a calendar. There is an external independent source of verification which is acknowledged to be acceptable and reliable. If, however, they disagree about whether or

not to tell a lie, they cannot easily refer the dispute to an external authority. Although references to such a moral authority in the form of a religious code or a moral theory may be made by the participants in the argument, these external sources are not necessarily accepted by each person involved in the disagreement. It is not a fact about which they disagree but a moral belief, which admits of factual verification only in so far as it is held by a person. Moral disagreements may concern the actions of people, their beliefs or their judgments in particular instances. Philosophers attempt to examine the nature of moral beliefs, the foundations on which they rest and the criteria by which actions, beliefs and judgments are said to be right or wrong. The codification of moral exhortations for the purpose of moral guidance is not essentially a philosophical task, although philosophers, like other people, may on occasions engage in such an enterprise. The examination of such codes, however, and the judgment of their usefulness in helping people to make moral decisions would undoubtedly be of interest to the moral philosopher.

The problem of aesthetic disagreement

Whether one prefers the music of Bach to popular music is a matter of fact. How one justifies this preference, and by what criteria one might judge one form of music to be superior to another, resembles the problem posed by moral disagreements. Like moral problems, aesthetic disagreements cannot be solved by an appeal to a generally accepted authoritative source of verification. The philosopher's interests in this area are concerned with the nature of aesthetic theories and with the criteria by which aesthetic judgments are made.

The problem of a just society

In the analysis of moral and aesthetic disagreements it generally emerges that the persons who disagree with one another hold quite different views of what a 'good' society should be like. Philosophers since Plato have attempted justifications for the state and of its political institutions. They have examined such institutions as property, the family, the legal system, government and public administration, international relations, education, class structure, religion, and culture. They have discussed individual rights, duties and obligations, and have considered the definition and use of such political terms as 'freedom', 'liberty', 'authority', 'power', 'consent', 'democracy' and 'justice'. The concerns of social and political philosophers overlap to some extent with those of the moral philosopher, and also relate to the work of political scientists and sociologists.

The problem of God and evil

Philosophers at all times have reflected upon religious beliefs and upon the content of particular religious systems. The philosophy of religion is not primarily concerned either to promote or to discourage particular religious beliefs, or to add to our knowledge of religious history. It attempts to analyze the doctrines of religion and its particular conceptualizations within the whole structure and economy of human thought. Thus, a philosopher may set out to analyze the concept of religion itself in order to show how it might be distinguished from moral codes or customs. Or he may reflect on what appears to be a paradox, from a purely logical point of view. If a religious doctrine asserts the existence of an omnipotent, omniscient and wholly benevolent God, and there exists much suffering and wickedness in the world, then logically both assertions cannot be true at the same time.

The conflicts between science and religion are by no means solved, and the agnostic's refusal to turn science into religion by accepting any scientific hypothesis as an article of faith, or to turn religion into science by regarding any article of faith as an empirically confirmed hypothesis, only illuminates the range of potential disagreements.

Philosophers and scientists

The description of some philosophical problems was deliberately put in a form in which they may be stated by philosophers, rather than by scientists or others. This does not mean that they do not relate to difficulties encountered in disciplines which appear far removed from philosophy.

The problem of class-existence arises in the course of devising any comprehensive classificatory scheme; the dichotomy between logical analysis and sensory perception arises in inquiries concerned with the application of mathematics to natural phenomena; problems of induction abound in all the sciences and particularly in the social sciences; the problem of the relationship between mental and physical phenomena arises in the pursuit of psychology, physiology and medicine; people experience moral and aesthetic disagreements in all kinds of circumstances; questions of social and political justifications pervade all human endeavours; and critically examining the claims of scientists appears to be of primary importance whenever a scientific theory is elevated to a general doctrine of life.

However, because the kind of problems that philosophers have made their own are also experienced in many different contexts, they

are often dealt with by scientists or others in a non-philosophical or pseudophilosophical way which distorts and falsifies the methods of philosophical inquiry. This is especially so when moral, aesthetic, social, political and religious disagreements are the issues. The purpose of the argument presented here is to show that 'philosophical' problems must be stated in 'philosophical' terms and must be dealt with by 'philosophical' methods, if a valid contribution is sought from 'philosophy' in the pursuit of knowledge. A comprehensive presentation of philosophical methods is beyond the scope of this chapter. None the less, a brief presentation of some selected philosophical methods may illustrate the kind of activities that are characteristic of philosophical inquiries.

Philosophical methods

In philosophy, as elsewhere, methods which are suitable for the solution of one kind of problem may be quite unsuitable for investigating another kind of problem. In addition, more than one method may be employed in examining a particular problem.

The method of systematic doubt

Some types of commonsense thinking differ from philosophical thinking only in degree. A proper method of philosophy consists of '... pushing a familiar mode of thinking to the extreme' (Körner, 1969). In everyday life, doubt is employed as a device to ensure the correctness of one's perceptions and judgments. 'I doubt it', as a response to another person's statement, will usually elicit explanations and justifications designed to remove the listener's doubt and to establish a degree of certainty in the matter. Taking 'doubting' to the extreme by questioning in principle all statements and assumptions concerned with a particular matter in hand, is a well-established method of philosophical inquiry. Starting from scratch, as it were, by ridding the mind of all accumulated preconceptions (as far as this is humanly possible) a systematic examination of hitherto accepted beliefs can proceed step by step. Such evidence as the problem admits, must be provided before a statement or assumption can be allowed to be accepted as being true, to the extent of which any truth in the matter can be established. A philosopher would argue that 'The feelings of being certain and of being unable to doubt a proposition are by themselves no sufficient ground of their truth' (Körner, 1969).

The method of phenomenological description

The absolute separation of the description of phenomena from their interpretation is also an extreme form of a very common and familiar procedure. When one meets a person in the street, one may 'describe' her conduct as a greeting and 'interpret' it as friendly. The interpretation appears to be more open to error than the description. If one wishes to reduce the possibility of an unwarranted interpretation, a more thorough and more detailed description of the words spoken and the gestures made would probably elicit a consensus that they actually constituted a greeting. One may set even stricter limits to the interpretation, by qualifying phrases like 'apparently' or 'as it seems to me'. Whether or not one will ever arrive at an ultimate or incontrovertible description which will allow for only one interpretation is perhaps questionable. Yet the philosopher will often have to push the distinction between description and interpretation as far as possible by insisting on details which, in everyday life, would be considered cumbersome and pedantic.

The method of philosophical analysis

Almost everybody at one time or another feels the need to examine, however haltingly, concepts which she uses, propositions which she habitually exerts, and systems of beliefs which she holds. There appears to be a greater compulsion in doing so '... when (s)he finds that the intellectual tools which (s)he employs with comparative ease in ordinary situations prove inadequate in extraordinary circumstances' (Körner, 1969).

Again, this method differs only in degree from common modes of thought. On the whole, philosophers are concerned with very general concepts (such as cause, number, existence) which pervade all thought, or with concepts common to virtually all the sciences (such as experiment and proof). They will examine concepts which appear to have no home in any special science (for example, beauty, moral obligation), and 'Last, though not least, (they) will assume the right to analyse concepts like 'memory' and 'perception', if their analysis by non-philosophical specialists seems one-sided or otherwise unsatisfactory to (them)' (Körner, 1969). Conceptual and propositional analyses follow set techniques which determine the rules governing the uses of the concepts and propositions under examination (Wilson, 1963; Körner, 1969). Conceptual analysis, in eliciting the specific meanings of words in a particular manner, uses other words to do so. Propositions, that is verbal statements or assertions formulated as sentences, may be similarly analyzed in

everyday language. They may, however, be examined and analyzed by the method of formal logic.

The method of formal logic

In its broadest sense, logic is the study of the structure and principles of reasoning or of sound argument. Logical arguments can be conducted in formal but verbal forms, like any other philosophical exposition. They can also be quantified and treated in a symbolic manner analogous with mathematical functions. This enables the logician to treat a formal logical system like any other quantitative system.

The method of dialectic

The term 'dialectic' means 'to converse' or 'to discourse'. It describes a conversational method of argument involving question and answer. It is illustrated in Plato's earlier dialogues which feature the Greek philosopher Socrates patiently asking questions in order that his listeners can come to recognize some true conclusions without him telling them that a particular conclusion is true. Often referred to as the 'Socratic method', it now encompasses the reasoning from generally accepted premises (Aristotle), the critical exposition of fallacious arguments (Kant), and the formal philosophical discourse that proceeds from thesis to antithesis and to synthesis (Hegel).

Philosophical perspectives in the study of nursing

In many ways, traditional nursing values conflict with philosophical approaches and methods. What a philosopher might call systematic doubt, nurses tend to see as evasiveness. Nurses tend towards seeking and forcing choice in order to establish prescriptions for actions. The tendency of philosophers to be global and to seek completeness and thoroughness by emphasis on structure rather than on mere enumeration of detail, contrasts with the nursing tendency to seek simplicity in unrelated details arrived at by random experiences. The widespread belief in nursing, that experience is superior to thought in every way, is one aspect of a certain anti-intellectual bias that is also evidenced in the resistance to identify, test, and validate nursing practices within an appropriate theoretical framework (Chapman, 1972; Graham, 1972).

Dickhoff and James (1970) point out these and other obstacles to a

philosophical, and indeed scientific, approach to nursing. They suggest that nurses should cultivate certain practices or habits of philosophers, by entertaining systematic doubt, and even promoting it actively, in order to expose unexamined beliefs; by suggesting and working with new terms and new structures when the old and familiar seem inadequate; by exposing and explaining errors and by exploiting them constructively; by seeking simplicity of action through principles rather than through further selection of more closely and more rigidly defined detail; by using examples of personal subjective experiences as mere heuristics (that is, as a means to find methods of discovery) and not as 'proofs'; and by risking purposeful disorientation as a step toward a richer reorientation.

Silva (1977) argues that, ultimately, all nursing theory and research is derived from, or leads to, philosophy. 'Through logic, researchers are able to establish the validity of various thoughts and the correctness of their reasoning. Germane to the research process is the ability to establish logical relationships between theory selection and problem identification, problem identification and hypothesis testing, hypothesis testing and derivation of valid conclusions.' Drawing attention to the contributions epistemology, metaphysics and moral philosophy can make to the process of nursing research, she further argues that philosophical introspection and intuition are legitimate methods of scientific inquiry. Nursing knowledge arrived at by the scientific method too often sacrifices meaningfulness for rigour. Cook and Laffleur (1975) maintain that experimentation, as an exclusive method of obtaining knowledge, is becoming a dead end, as too little meaningful behaviour can be understood by this method alone. Weatherston (1979) demonstrates the use of conceptual analysis in identifying important aspects of the activity we call 'nursing', and in providing a basis for deciding what theory of nursing is. McFarlane (1980) uses the method of philosophical analysis to describe theory and its relationship to nursing knowledge and practice, and to compare four theoretical proposals for a conceptual framework for guiding nursing action and for controlling its outcome. Dialectic is demonstrated as an appropriate method for exploring moral dilemmas in health care, by Thompson (1979).

In spite of the rather more widespread misuse of 'philosophy' by nurse writers, which caused this argument to be presented here, there is some indication that philosophical methods of inquiry are as appropriate to nursing as to any other human endeavour.

Almost any standard dictionary definition of philosophy contains a statement similar to 'literally meaning "love of wisdom"', philosophy came to stand for knowledge in general about man and the universe,' (Lacey, 1976).

The sciences, as we know them, have undoubtedly produced specific and general knowledge about man and his world in a way which is not open to philosophical inquiries. But it is still appropriate to conclude this paper with a quote taken from Karl Jaspers' *Way to Wisdom* (1951): 'The sciences do not encompass all of the truth but only the exact knowledge that is binding to the intellect and universally valid. Truth has a greater scope, and part of it can reveal itself only to philosophical reason.'

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Two aspects of psychology and their application to nursing

MARGARET CLARKE

One broad definition of nursing includes '... helping the patient to carry out the activities of daily living that he would, if well, carry out for himself, teaching patients, enabling patients to become or remain independent by achieving the skills and knowledge to be in control of their own health, coordinating the work of other people helping the patient, carrying out the prescriptions of doctors, and maintaining a suitable environment in which to nurse the patient' (Royal College of Nursing of the United Kingdom, 1979). The Committee on Nursing (HMSO, 1972) commented in paragraph 137, 'Their (nurses) central role is to ensure the care and comfort of the person being nursed, to maintain oversight and coordination of that care and to integrate the whole—both preventive and curative—into an appropriate social context.'

Key concepts here are 'helping', 'teaching', 'enabling', 'coordinating', 'care', 'comfort'. These are nursing functions: they all involve other people. Psychology, the study of behaviour, is fundamental to an understanding of nursing functions. It is fundamental in two ways: one is as a science which helps us to understand the person who we are 'helping', 'teaching', 'coordinating', 'enabling', 'comforting'; the other is to understand ourselves and the way in which we interact with others, so that we may utilize our skills in a way which will most help our patients or clients at least cost to ourselves.

Psychology as a subject of study

Psychology is a science. Science is a systematic accumulation of knowledge which helps to make sense of our world, to predict the future and ultimately to control events. As a science, psychology is 'younger' than many other branches of science, such as physics and chemistry. Even so, a great deal of knowledge has been amassed and it is impossible to deal, even superficially, with the whole of psychology in one chapter.

At the same time, psychology as a science is less 'cut and dried' than physics and chemistry, or even physiology. This is partly attributable to the 'youth' of psychology as an area of study, but is mainly because the behaviour of human beings is immensely complex compared with the behaviour, for example, of atoms and molecules, or even of the renal system. The very complexity of human behaviour means that there are many alternative perspectives from which to view it. One perspective (theory or model) may help us to understand a particular aspect of behaviour, while a different perspective may help us with other aspects of the same behaviour. However, it is necessary to integrate different perspectives to give a rounded view.

An analogy, is the distorted view that we would get of the appearance of a human being if all we could see was a skeleton. A skeleton helps us to understand one aspect of human shape, but we could not possibly reach even our present incomplete understanding of man's anatomy and physiology unless other perspectives and information were available. Even for an understanding of the skeletal system, nurses need knowledge at both a more fundamental level (for example the biochemistry of bone) and at a macroscopic and integrative level. For example, they need to understand how bone and muscle function together through the action of the nervous system, and how the growth of bone is controlled through the endocrine system.

Psychology can be looked at in the same way. Knowledge of fundamentals of behaviour at the 'microscopic level' is needed for some purposes, but we need to shift our focus to see how a microscopic analysis of behaviour fits into an understanding of the whole person, as an integrated member of society with a past and a future.

The study of psychology includes many different levels of analysis and many theoretical viewpoints which can be applied to different aspects of behaviour, or even to the same aspect of behaviour. It is important to recognize that the levels of analysis and theoretical perspectives dealt with here have been chosen from those available through my own particular perspective. This points to another of the complexities of psychology as opposed, for example to physics—its reflexivity. Atoms do not study atoms, but in psychology man studies man—including himself. What a person chooses to study within psychology, and the theories he selects to explain behaviour, may well be biased by his own past experience and/or his parents' attitude toward people. He may or may not be aware of this bias.

Psychology is an experimental science; knowledge is accumulated by experiments in which cause and effect may be elucidated. A

further complexity of its study is the way in which the subjects in an experiment may influence the experimenter in an unpredictable way. There is an old cartoon showing a rat in a conditioning experiment saying 'I've sure got this chap [the experimenter] trained; I only have to press this lever and he gives me a food pellet'! At least the hazards of an experiment in chemistry do not include the chemicals interacting with the experimenter.

Behaviourist psychology

A fundamental topic of study in psychology is the study of learning. Learning is defined as a relatively permanent change of behaviour as a result of experience which cannot be attributed to drugs, fatigue or simple maturation. It will be seen from this definition that a study of learning is basic to an understanding of the bulk of man's behaviour. Our knowledge of learning is heavily dependent upon the work of a Russian physiologist, Ivan Pavlov, of which most people will have at least a superficial understanding. He studied what is now called classical conditioning. (Pavlov, 1927).

Classical conditioning

In classical conditioning an unconditioned stimulus (UCS) such as meat powder is placed in a dog's mouth. This elicits the unconditioned response (UCR) which, in this case, is a flow of saliva. In Pavlov's experiments a neutral stimulus, such as the sound of a bell, was presented immediately before the food was placed in the dog's mouth. Eventually, salivation was elicited when the bell sounded, even in the absence of food. The previously neutral stimulus is now termed the conditioned stimulus (CS) and the salivary response is called the conditioned response (CR). This resembles, but is not identical to, the unconditioned response or natural reflex. Pavlov spent years carrying out a meticulous series of experiments in which he investigated the conditions under which conditioned reflexes occur, and how they are extinguished, and also accurately measuring the conditioned response. Classical conditioning, in which an organism becomes responsive to a previously neutral stimulus by association with meaningful stimuli, is a basic learning process on which others are built.

Operant conditioning

At roughly the same time that Pavlov was working in Russia on conditioned reflexes, Thorndike (1913) an American psychologist was

studying learning in cats. From his work, some early laws of learning were derived. Later, work carried out by B. F. Skinner (1953) developed this further and added to our knowledge of operant or instrumental conditioning. Operant conditioning, like classical conditioning, seems to be a fundamental learning process. Operant conditioning has been studied intensively using animals and birds as experimental subjects. The experimenter arranges a controlled environment in which the animal's behaviour can be closely observed. He specifies a naturally occurring movement and, when this movement is observed to occur, a reward follows immediately. Invariably the reward used is food and its potency as a reward is enhanced by ensuring that the animal is hungry before the experiment begins. Movements which have been so rewarded are repeated by the animal, and so are strengthened. This process of rewarding a specific response which is then repeated, is called reinforcement. A concrete example is shown by a hungry rat placed in a specially designed cage. At first the rat roams around the cage but eventually he accidentally presses on a bar protruding into the cage, and this triggers the automatic delivery of a food pellet. After this has happened a few times he presses the bar more and more frequently, until his behaviour is concentrated entirely upon bar-pressing and consuming food pellets. Up to 450 bar presses per hour have been recorded. The whole process is called positive reinforcement.

It is also possible to describe negative reinforcement or avoidance training. Here, an animal can be taught to avoid a hurtful (negative) stimulus by carrying out a specific action such as running from one side of a cage to another when the negative reinforcement is signalled.

Responses learned in this way may be extinguished by two methods. One of these is to stop reinforcing the response. Eventually the animal will cease to perform the action, but this may well take a long time, particularly if the response has been reinforced only intermittently. The other way in which a response may be extinguished is by punishment. If the response is followed by a painful stimulus, then the animal quickly learns to suppress or inhibit the response. Most experimenters agree that non-reinforcement is a more potent method of weakening a response than is punishment. Although punishment appears to work quickly, it is thought that it merely inhibits the response temporarily until the conditions under which punishment occurs change, when the response reappears. Much is known about reinforcement of behaviour as a result of a great deal of experimental work. Three important findings will be mentioned here.

First, when a response has been learned it will be more resistant to

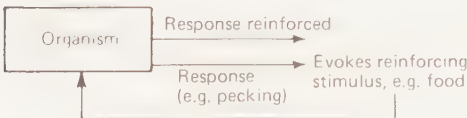
extinction by non-reinforcement if reward is given only intermittently rather than following every response.

The second finding is that a stimulus which occurs in association with a primary reinforcer, can acquire the property of acting as a reinforcer itself. Such a stimulus is called a secondary reinforcer and the concept has been used to explain why it is that social reinforcers, such as praise and smiles, act as rewards to human beings. Some psychologists, however, claim that the establishment of exactly which events act as reinforcers should be proved experimentally. By definition, a reward is a stimulus which reinforces behaviour which precedes it. This may be illustrated by an example: the naughty behaviour of some children appears to be reinforced by a scolding. For them, attention from an adult is more rewarding than being ignored.

The third important finding is that, at one time, it was thought that only responses subserved by the voluntary nervous system could be reinforced. It is now known that it is possible to reinforce responses subserved by the autonomic nervous system. In a series of experiments, (see, for example Dicara and Miller, 1968) Miller was able to demonstrate that the use of reinforcement could reduce or increase the heart rate of rats, even when the voluntary muscular system had been paralyzed by the use of curare. This principle has been used to help people to gain control over their autonomic functions, such as blood pressure, by techniques known collectively as biofeedback. The reinforcer which is used may be a signal such as an audible tone which is used, for example, to indicate when the



Classical conditioning



Operant conditioning

Figure 12.1 Classical and operant forms of conditioning. In classical conditioning a neutral stimulus paired with an unconditioned stimulus comes to evoke an attenuated form of the unconditioned response. In operant conditioning, a rewarding stimulus which follows a response, strengthens that response

subject's blood pressure is at, or below, a target level. This increases the probability that his blood pressure will stay at or below the target level.

Figure 12.1 illustrates classical and operant conditioning, in diagrammatic form.

Applications to nursing

Although learning is a complex process that cannot be explained solely in terms of classical and operant conditioning, some aspects of human behaviour can be usefully described in terms of conditioning. It is a psychological perspective which is applied to patient care.

Psychiatric nurses, in particular, will be familiar with the concepts of classical and operant conditioning, because they are used in two ways in the treatment of patients. In a general way, operant conditioning principles may be used to overcome or to prevent the problems of institutionalization. Ayllon and Azrin (1968) drew attention to the tendency for psychiatric nurses to ignore patients, for example, who were sitting quietly and conversing, whereas the nurses *did* pay attention to those patients who showed disturbed behaviour. In behavioural terms, the nurses were reinforcing maladaptive behaviour while extinguishing normal behaviour. Ayllon and Azrin were the first workers to describe 'token economy' wards. In such a ward, tokens are given by nurses immediately a patient achieves a target behaviour. The tokens may be exchanged at a ward shop for small items such as cigarettes, chocolate, tinned food or handkerchieves, or for privileges such as the right to a single room, or watching television. Target behaviour might include ward tasks such as laying the table; washing up; social interaction; neat appearance; or arriving to meals on time. The award of the token is contingent upon the desired behaviour.

In a more specific way, classical or operant conditioning principles may be used in behaviour therapy to treat a patient who has a psychiatric symptom, such as a phobia. Behaviour therapy is within the competence and responsibility of clinical psychologists, but it is often carried out by nurse therapists who are specially trained in these techniques (Marks *et al.*, 1977).

An example of the application of classical conditioning to the treatment of phobia is a method called desensitization (Wolpe, 1958). The basis of this method was described by Jones (1924) in the treatment of a child who was frightened of rabbits. The child was given food in the presence of a rabbit. At first the rabbit was at some distance from the child, but was gradually brought nearer and

nearer on successive occasions. The initial fear response to the presence of the animal (the stimulus) was extinguished and the stimulus came to be associated with the pleasurable response to food, by being paired with the presentation of food (unconditioned stimulus). This is called counterconditioning. Systematic desensitization includes training in muscle relaxation as well as counterconditioning.

The concept of reinforcement has applications in general nursing and health visiting as well. One of the most important functions this type of orientation can serve is to help the nurse to analyze situations and to determine the effect she is having on other people. A health visitor may be able to use the idea of reinforcement to analyze and advise when a child has developed a particularly annoying habit. An example is a child who shouts for his mother's attention in shops. It is easy to see how this may have arisen. Mother's attention will have been concentrated on her shopping and she will have paid attention to the child only when he raised his voice. Advice will be centred on ignoring the shouting but paying attention to the child when he speaks quietly.

In general hospital wards we need to identify that behaviour of patients which is being reinforced by nurses. During the acute stage of illness, or following a major operation, passive compliant behaviour is important and is reinforced. Later, the patient needs to develop increasing independence. However, nurses may well continue to reinforce dependent behaviour by doing things for the patient which he should do for himself.

The unpopular patient

A study by Stockwell (1972) illustrates the way in which nurses and patients show rewarding or punishing behaviour towards one another. Stockwell used a method of non-participant observation in four wards to record the type and amount of nurse/patient interaction. She obtained further information by interviewing the nurses working in these four wards. Using these methods, Stockwell was able to identify the behaviour which characterized the patients the nurses most enjoyed caring for, and those they least enjoyed caring for.

Nurses most enjoyed caring for patients who were able to communicate regularly with the nurses; who knew the nurses' names; who were able to joke and laugh with the nurses; and who cooperated in being helped. That sample of nurses least enjoyed caring for those patients who grumbled and complained; who showed a lack of enjoyment at being in hospital; who implied that

they were suffering more than was believed by nurses; or who suffered from conditions that, nurses felt, could be better cared for in other wards or in specialized hospitals. One can contrast the behaviour of the popular patients as rewarding the nurses for interaction, whereas the behaviour of the unpopular patients either tended to punish nurses who interacted with them, or could be seen as unsatisfying in the long term because there was little possibility of them getting better as a result of care in that particular ward.

Stockwell was able to describe the nurses' behaviour towards popular and unpopular patients, and she categorized this as 'rewarding' behaviour on the one hand, and as the 'use of sanctions' on the other. Rewarding behaviour used by nurses included willingness to give more time; allowing a more personalized interaction; willingness to accept gifts and favours; allowing lapses in keeping to the rules. Sanctions used by nurses included ignoring the patients; forgetting the patients' requests; refusing gifts and favours; enforcing rules; using sarcasm. The first two items on the list of sanctions can be seen as behaviour which could have been designed to extinguish unwelcome responses through non-reinforcement.

Another interesting finding of this part of the study showed that nurse/patient interaction occurred under two conditions—in association with tasks which the nurse had been assigned to carry out for a patient, and those which were patient-initiated. This meant that patients who did not initiate interaction with nurses could go for long periods of time without being spoken to by nurses. They could also have nursing care carried out without a single word being spoken by the nurse. The group of patients to whom this applied were seen by the nurses as being neither popular nor unpopular. It is a situation similar to that in psychiatric wards, where 'normal' behaviour may be ignored and may therefore not be reinforced. In this case, neither nurse nor patient was rewarded for interaction, and none occurred.

It is possible that nurses in wards where patients are confused may be reinforcing confused behaviour by paying attention to confused patients, to the detriment of those who are well orientated in time and place.

Ward sisters (head nurses) and staff nurses should beware of reinforcing inappropriate behaviour among student nurses. Many ward sisters show approval toward nurses who get the work done quickly, when it might be more appropriate to praise excellent and thoughtful nursing care which takes longer to complete. Senior ward staff may show disapproval when nurses sit and talk with patients. In this way, nurses not only learn not to talk with patients, but

themselves come to disapprove of talking. This may have been a factor in the finding of Stockwell (1972), that nurses felt 'guilty' if they 'chatted' to patients because their colleagues would think they were slacking. They also felt uncomfortable during slack periods in the ward, but did not feel that having conversation with patients constituted 'work' at such times.

Social psychology and nursing

Childhood is a time during which a great deal of learning occurs. A helpless infant who has to be fed, clothed, changed and carried, eventually becomes an independent adult who can converse in one or more languages, earn his living and not only look after himself but, as a truly social person, also look after others. The process by which an individual comes to take on the adult attributes (attitudes, values and behaviour) of his cultural group, is called socialization. It is brought about by interaction with others. Obviously, the best example of socialization is the process of bringing up children. It is recognized, however, that socialization does not end when an individual reaches adulthood, but continues throughout life as he joins different groups, organizations and institutions. Becoming a professional involves learning appropriate values, attitudes and behaviour and can be seen as a process of professional socialization. Nurse training can be seen in these terms.

Attitudes have been defined as the way in which our past experience is summarized, stored and organized as the individual approaches a new situation to which that past experience is relevant (Newcomb, Turner and Converse, 1966). The word 'attitude' refers to regularities of an individual's feelings, thoughts and predispositions to act towards some aspect of his environment (Secord and Backman, 1964). It is an abstract hypothetical construct which is not open to direct observation. What an individual's attitude is towards his family may be inferred by the way he behaves towards them or by what he tells us about his attitude to them. Most of us are used to opinion surveys. Attitudes involve greater strength of feeling than do opinions. These feelings may be negative or positive.

Values are usually defined as systems of attitudes towards a class of (usually) abstract concepts. Thus an individual may have an attitude towards abortion, but the value system of which that attitude is a part is centred around the issue of sanctity of human life or the importance of women's rights. Value systems are seen by some psychologists (e.g. Allport, 1955) as characterizing the total personality.

Behaviour is the way we act. It is influenced both by our attitudes and values, which bring past experience to bear, and by the demands of the situation as it occurs. It will be noted that this is a broader view of behaviour than an analysis in terms of operant conditioning, where behaviour is seen as being influenced by the consequences of the act, in other words, the reinforcing contingencies. An extreme behaviourist psychologist might argue that attitudes and values are the result of a life history of reinforcements, but this view fails to account completely for the way in which we learn attitudes from others.

From the point of view of professional socialization, interest in attitudes centres around attitude change, because student nurses arrive to train with their own set of attitudes and values, which may be similar or dissimilar to those of the professional group they are to join, depending partly on their reasons for the career choice and partly on the selection procedure. Three years later, their attitudes and values will reflect those of their training school.

Attitude change

Kelman (1966) suggests that attitudes and values are changed through processes of social influence. These processes are called compliance, identification and internalization.

Compliance occurs when the individual agrees publicly with the attitudes of another person, in order to gain reward or to avoid punishment, even to the extent of contradicting his own consciously acknowledged beliefs. Nursing stresses compliance in both attitudes and behaviour, because a new student nurse has neither the knowledge nor the skills of a ward sister or staff nurse. Indeed, even the nurse in the set above has acquired a degree of knowledge and skill and can thus demand compliance. On her part, a new student will not wish to question, let alone contradict, attitudes of staff towards, for example, the value of social interaction with patients. She wishes to be accepted and to fit in as a member of the ward team.

Identification occurs when the student begins to adopt the attitudes of the group she has joined, as her own, because she wants to be like ward sister and other members of the ward team. She has reached the stage, through learning, of being able to predict their attitudes and behaviour in both new and familiar situations, and to hold those attitudes herself. However, the attitudes persist only as long as the relationship with the ward team is a positive one and the individual gains satisfaction from holding similar attitudes to them.

Internalization occurs when the individual's own attitudes are changed to be similar to those held by the ward team. The attitudes

have become intrinsically rewarding and are part of the student's self-image, helping to define the kind of person she is. The change of attitude is permanent.

The process of attitude change described by Kelman (1966) can also be seen as a learning process. At the compliance stage, the individual is learning about the attitudes and values held by others, noting which types of behaviour evoke a favourable or unfavourable response. During the identification stage, more learning has taken place and regularities in behaviour and expression of attitudes on the part of others has led the individual to conceptualize their value system. The student is beginning both to understand others and to predict reliably what they will feel and how they will behave under different circumstances. By the internalization stage, the lessons have been learned so well that the values and behaviour have become automatic as an expression of her own personality.

Group processes

From the point of view of the group, the process of attitude change in a new group member can be seen as ensuring that she conforms to the values held by the group. It is brought about by reinforcement, non-reinforcement or punishment. When she is allocated to a hospital ward, a student nurse joins a group which is already in existence and which has an ascribed leader, the ward sister. Study of groups has shown that, with time, the behaviour attitudes and values of group members become more similar to one another and are usually exemplified by the group leader. Common behaviour attitudes and values held by the group (called group norms) differentiate the group from other groups. By way of an example, think of the very different group norms shown by pupils of an English public school as opposed to those of a comprehensive school.

Group norms operate most powerfully when a situation is ambiguous; at that time a person looks to other members of the group for guidance in the interpretation of the situation, or to find out what is the most appropriate action in the circumstances. In nursing, we are confronted day by day with problems of deciding priorities of action: for example, whether it is more important to bath a dependent patient or to welcome a new patient; to answer the telephone or to take a patient to the toilet. Other members of the ward team help us to establish priorities by transmitting their values and attitudes to us. Group behaviour which influences the member of the group is called 'norm sending'. It has three essential components:

1. Defining the attitude or behaviour in question
2. Monitoring the extent to which the person conforms to the norm
3. Applying sanctions (rewards or punishments) for conformity or non-conformity.

Ward attitudes towards the problem of work priorities may differ greatly from those taught in the school of nursing. There is often an emphasis on speed in the ward, which implies cutting corners, whereas the school of nursing emphasizes thoroughness and care. As a new nurse arrives on a ward she may well be told to 'forget all that nonsense you were taught in school; we do it this way here', or 'In this ward we believe that . . .'. These are illustrations of norm-sending behaviour. There is no problem for students who readily conform to ward norms, but the impact on individuals who try to uphold the values they have been taught in the school of nursing may be severe.

Coping with a clash of values

There are several possible coping strategies that a nurse might adopt when her internalized values clash with ward norms.

1. She may comply with ward norms as expedient, while internally holding fast to her own value system. This means staying at the compliance level of attitude formation with respect to ward group attitudes and never proceeding to identification or internalization. Such a course of action requires the student to dissociate herself from the ward group and to maintain a strong belief in the morality of her own values. It helps if the student can relate to a group of which she feels a part and which holds values similar to her own (a reference group).
2. She may carry out nursing care in a way which upholds her own internal values in the face of pressure from the ward group to conform to their norms. This pressure is likely to be extreme and to cause stress to the individual. Social support from someone belonging to her reference group may be the only way in which she would be able to persist in this course of action.
3. Finally, the nurse may comply with ward norms in what she considers to be less important areas, while maintaining internal norms and values in what she deems to be essential areas for her self-esteem. This is a form of bargaining: she conforms in some respects in return for being allowed non-conformity (or

deviance) in other respects. Given that the nurse manages to negotiate her role in this way, she may ultimately come to influence other members of the ward team. The norms of the group will then come nearer to her own, because she is helping to determine those norms.

Reality shock

Kramer (1974) has studied the conflict of values which occurs among nurses in the U.S.A. The group on which she focused was one of nurse graduates who had strongly internalized the professional values of their instructors during their undergraduate nursing course. On their initial employment in hospital after graduation they were faced for the first time with a bureaucratic value system. (*Table 12.1*). In her

Table 12.1 Characteristics of a bureaucracy compared with those of a profession (From Kramer, 1974)

<i>Characteristics of a bureaucracy</i>	<i>Characteristics of a profession</i>
Specialization of roles and tasks	Specialized competence having an intellectual component
Autonomous rational rules	Extensive autonomy in exercising special competence
Overall orientation to rational, efficient implementation of specific goals	Strong commitment to a career based on a special competence
Organization of positions into a hierarchical authority structure	Influence and responsibility in the use of special competence
The impersonal orientation of contacts between officials and clients	Development of training facilities that are controlled by the professional group
	Decision-making governed by internalized standards

book, Kramer describes the impact this had on the nursing graduates and likens it to the culture shock described by anthropologists. She coined the phrase 'reality shock' to describe the nurses' reactions. Three stages: honeymoon; shock or rejection; recovery or resolution, may occur in reality shock. Its cause is the discrepancy between what the new graduate learned was valued during her pre-work socialization, and the values and behaviour she finds in the reality of the hospital. Contributory causes of reality shock arise from the primary clash of values and include interpersonal incompetence, inability to bargain for identity, and lack of role negotiation.

In the 'honeymoon' period there is fascination with the new

environment and everything appears wonderful. To an extent, this is helped by the reaction of the hospital staff as they welcome the newcomer. Soon, however, shock or rejection occur as the graduate learns how alien are the values and behaviour which are rewarded in the bureaucratic system. Kramer describes different reactions which may occur. One is rejection of the new environment, which may be so complete that the nurse resigns her post. In others, their attention is focused on the illness and fatigue which often accompanies the shock and rejection phase. Other individuals may reject their own self-image, regarding themselves as hopeless failures. The recovery phase may be signalled by a beginning sense of humour and a capacity to assess objectively what is going on in the new environment as the new colleagues become more predictable. The final stage of recovery results in the individual coming to terms, both with the new set of values and her old set of values, and coping satisfactorily with both.

Kramer believes that it is important for the nursing profession and the development and improvement of patient care, that nursing graduates retain at least some of their professional values and do not entirely embrace the bureaucratic system. She developed an experimental programme of 'anticipatory socialization' during the undergraduate course, to help students to avoid or to cope healthily with reality shock as graduates. The aim was to help them to uphold professional values within the bureaucratic system.

The anticipatory socialization programme comprised many elements:

1. Students were helped to gain an understanding of both the professional and bureaucratic systems and the differences between them
2. The students' own professional value system was attacked, so that they learned to defend it, and it was strengthened in the process
3. Students were exposed to role-conflict episodes in their course, following which, these episodes were analyzed in terms of the different value systems. This helped students both to understand their own feelings and the point of view of others. It allowed them to think through, and develop, strategies which would be useful later. Kramer likened this to a method of 'immunization'.

These three components of the programme can be related to research findings in social psychology, showing that a two-sided argument is more effective than a one-sided argument in the formation of attitudes (Lumsdaine and Janis, 1953) and that role-

playing the behaviour reflecting a given attitude strengthens that attitude (Greenwald, 1970).

In addition, students were helped to acquire skills and knowledge which would help them later:

4. They learned the methods of resolving role conflict and the skills of role negotiation
5. They learned about the process of professional socialization
6. Students learned skills of coping in a new ward or job; for example, methods of obtaining information, how to observe the flow of work, and generally how to abstract salient features of an organization in order to function within it
7. They were taught change strategies and leadership skills
8. Students were shown how to identify a professional role model in the work situation and to learn from such a person
9. Throughout, there was stress on the value of patience and not giving up too easily, because strategies may work at one time and not another, or in one setting and not another
10. Students were helped to develop a tolerance of uncertainty. (This would help them to rely on their internal norms rather than having to look for guidance from others in an ambiguous situation.)

Applications to the education of nurses

Nurse education in the USA, which is the context of Kramer's thesis, is very different from the nurse training system in the UK, and British professional and bureaucratic values are slightly different from American ones (*Table 12.2*). None the less, there are useful lessons to be learned here.

In the apprenticeship type of training undergone by the majority of British nurses, it is likely that any reality shock occurs much earlier, during training itself, probably on exposure to the first ward. Whether or not it will occur, depends on factors mentioned earlier, that is, whether the values taught in the school of nursing have been identified with or internalized. Given an 8-week introductory course, this is unlikely to have happened. However, there are many nurses who start their training with a set of expectations about nursing, and already holding humanistic values, which may clash with the bureaucratic values of ward staff, much as do the professional values of American graduates. Indeed it is probable that, in some hospitals at least, individuals are selected for training because they hold humanistic values. The study by John Birch (1975), *To Nurse or not to Nurse*, can be interpreted in this light.

Table 12.2 Comparison of the British bureaucratic and professional value systems in nursing

<i>British bureaucratic value system in nursing</i>	<i>British professional value system in nursing</i>
Getting tasks done is important	How things are done is more important than speed
Procedures should be carried out in the way laid down	Procedures should be modified in response to patients' needs
Doing is more important than talking	Talking is as important as doing
It is wrong to get emotionally involved with patients	One can't help patients unless there is some emotional involvement
Giving patients information only makes them more anxious and worried	Giving patients information reduces anxiety and stress
Practice is based on tradition	Practice is based on research findings and scientific knowledge
People who carry out nursing should have little or no discretion in case they make mistakes	People carrying out nursing care should be professionals who are responsible for their own practice
Theory is of little value to practice	Theory should inform practice
Loyalty to colleagues is paramount	Doing the best for patients is paramount even if it means disloyalty to colleagues
Administrative neatness and convenience is important	Administration is meant to help and serve practitioners
There is little point in finding out how things are done in other institutions or countries since one's own problems are unique and other's experience is of no value	People in other institutions, other professions and other countries have similar problems. Their solutions may be helpful
Patient allocation means that the work doesn't get done	Patient allocation is valued to ensure that care is appropriate to the patient
Acknowledging mistakes is wrong as nurses shouldn't make mistakes	One can only improve by acknowledging mistakes
Nursing care associated with activities of daily living requires little skill and can be done by people with little or no training	Nursing care associated with activities of daily living may require an enormous amount of skill depending upon the physical condition and mental make-up of the patient
There is a correct answer to all problems	There are many perspectives on problems and there is frequently no correct answer but a series of possible solutions
Higher authority in the structure is used to legitimize actions	Rational argument is used to legitimize actions

Most of the case histories he quotes, of nurses who abandoned their training, show the impact of a clash of values between those of the student and those encountered among senior staff.

Students on nursing degree courses may experience a greater clash of values than the majority of student and pupil nurses, although unlike similar students in the USA, they come into contact with the hospital value system at a relatively early point in the course, before there has been time to internalize a professional value system. This is because undergraduate nurses visit the wards for shorter periods than other nurses, and this exposes them to the bureaucratic value system for shorter periods. At the university or polytechnic they come into contact with many other value systems, including the high value placed on thinking and learning. In higher education a professional model of organization is used, rather than a bureaucratic one, and they see this day by day. Smaller staff: student ratios compared with those in schools of nursing, ensure that students are exposed to the professional value systems of their lecturers, who may also have the advantage that they can present a more articulate argument in favour of their values than anyone at the hospital can present in favour of bureaucratic ones.

Non-conformity

On their part, staff at the hospital are likely to detect non-conformity in undergraduates very readily, as they will be expecting it from people who work different hours, have student status and belong to the world of the university or polytechnic, rather than the world of the hospital. They will therefore bring much pressure to bear to ensure conformity to ward norms, and this will contribute to the stress experienced by the undergraduate student.

Probably all undergraduate nursing courses should include an anticipatory socialization programme similar to Kramer's, but there are ways in which students may be helped without planning a special course.

1. Their lecturers can give social support by letting it be known that they are ready to listen to students who are experiencing difficulties
2. Students can be helped to develop sensorimotor nursing skills to a high level, so that they feel confident in the area which is most valued by ward staff and students on conventional nurse training courses
3. Seminars can be held in which students present problems they have encountered. Discussion can include an analysis of the different value systems and perspectives of the participants in the incident
4. The group cohesion which is likely to exist among the undergraduates can be mobilized to produce a peer support system

5. Role models, such as nurse graduates, can be identified within the bureaucratic structure with whom the students can identify
6. Lecturers can give institutional support to students by placing the obligation on them to work according to professional values (to interact with patients for example) as a course requirement or as a requirement for assessment purposes. Such an activity is then legitimized in the ward staff's eyes, as imposed by authority. It is far more effective if the ward staff are given a role in teaching or assessing the work in question

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Educational studies and nursing

HAZEL O. ALLEN

'Education does not mean teaching people to know what they do not know, it means teaching them to behave as they do not behave'.
Ruskin.

Education is an amalgam of the behavioural sciences and the art of teaching. It is difficult to apply the aims and methods of science to individuals, although statistical principles can be used to explain group behaviour and a scientific diagnosis of their physical structure is helpful. Teaching involves emotions which are difficult to employ, and values which are outside the grasp of science. Although some formulae may be used to plan strategy and tactics, in the final analysis teaching is less like inducing a chemical reaction and more like composing a symphony, each theme and movement, often sufficient in itself, yet bound together forms a whole.

A great deal of teaching is done by nurses. Some is evident, but some goes on at an obscure level, in the subconscious. We have all experienced it, and forgotten it. It is, however, crucially important because it is buried so deep. This fact has been used commercially in advertising such things as baby foods, medication and nappies. Seeing a nurse use a product will commend it to public use. Not a word need be spoken. It follows that the professional nurse has the responsibility and excellent opportunity to help people towards good health when they are sick, and to promote health education in both sick and well. These may include patients and family, school teachers, managers in industry, and their own co-workers—volunteers, nursing auxiliaries and nursing students.

This relationship with such a variety of people, coupled to a responsibility for health, makes the nurse's role as a teacher a vital one. Nurses should be opportunists, in the best sense; situations for teaching are always with them. They need to know how to determine learning needs and how to help people learn, if the opportunities are to be grasped. The nurses' preparation for teaching is much more limited than that of the professional teacher, yet their learners are less uniform and their needs are as diverse. Little time is given to the

subject in the curricula of the schools of nursing, yet principles of learning and teaching are essential tools for the educational process implicit in health care.

Principles of learning

A report of the work of the curriculum study group at St Thomas' Hospital, London (Bradley, 1978) stated the objectives for a student nurse in her first medical ward is helping patients to learn by the following:

1. Discussing the need for patient involvement and decision making in planning and carrying out treatment
2. Demonstrating an increasing competence in simple teaching skills

Excellent in themselves, these objectives need to be seen within the context of developmental psychology and social learning and imitation (Miller and Dollard, 1962). When discussing the need for patient involvement it is helpful to reflect on the work in developmental psychology of Jean Piaget (1965), who assisted our understanding of the growth of a child's power of mental organization. Piaget studied the processes and stages of intellectual development of children from birth, but it must be recognized that Piaget's tests were designed to assess, not to teach. He sees the growth of the mind as a process of unfolding through a sequence of changes of behaviour, and maintains that a child has to learn how to think, through personal experience. He confirmed that mothers who allow their child to 'do' are allowing them to learn. One cannot learn to dress oneself, to make a cake or to mend a fuse, by knowing the theory alone. Doing comes first and when one becomes familiar with the materials, then one can begin to experiment.

Although most nurses' teaching will not be with a child, the principles of providing a learning environment are much the same, particularly with some patients who regress to child-like behaviour during their illness. The most intelligent people, when unwell, will need to 'do' if they are to return home enabled to care for themselves. The 'doing' may be simple or complex, but each requires attention, as shown by the following anecdote:

A headmaster, discharged from hospital after haemorrhoidectomy returned to the outpatient department 10 days later and was found to be extremely dirty around the anal area.

When questioned, it was found that he had not taken a bath since discharge. He stated that he had not known how much

salt to put in the water and dared not bath without it! He had watched the nurse twice a day putting her 'magic' handful of salt in the bath and thought it was essential. He felt he could not ask.

If he had been helped to prepare his own bath this would never have happened.

Teaching

Regarding primary school teaching, Hobart (1974) states that 'Language without experience is inadequate, so is experience without language'. There must be opportunity to discuss findings with an understanding 'adult'. The child must be able to question his discoveries and learn to ask for help where he is uncertain. The teacher's art lies in deciding what help is needed and how this help may be offered.

Concepts cannot be taught but are acquired through a variety of experiences from which they are eventually extracted. Teachers must cooperate with the child's inward growth and use their own understanding as a means to lead and guide the child; they cannot translate their own mental models into the minds of children by means of explanation. If the teacher does not work at the child's own level, the child's mind is left behind and rule-memorizing or rote-learning is begun.

Patient teaching

Similarly, in teaching patients there is no impression without expression, and having discovered where the patient 'is', or assessed his understanding and mental models, the 'doing' needs to be translated into language and developed according to ability. Although the headmaster needed to 'do', he also needed information on the 'why' of salt in the bath, because he had wrongly assumed that salt was an essential for the healthy condition of his wound. Yet for another patient it might have been important to just teach the 'doing' and explore the need for rote-learning, which for success relies on remembering the recipe while appreciating that memory is unreliable.

How often do we give written information when rote-learning must be prescribed? Simple instruction (to nurses) may be a mammoth task to others. The nurse's responsibility is to assess the learning need of the patient after initial observation. Nurses are so accustomed to illness, hospitals and clinics that it is easy for them to forget that these are frequently new experiences to patients.

The technique of giving an injection is an example. If the basic points are skipped over quickly, the patient will probably find difficulty in performing the procedure. The teaching process is similar to the nursing process, requiring observation, assessment, making a plan of teaching, giving the teaching and finally evaluating the effectiveness of the teaching. And all this needs patient involvement in the decision-making plans.

To start with specifics related to carrying out a procedure, and not principles, would mean following the psychology of learning developed by Gagné (1970) and recommended by Bendall (1977). Gagné describes a hierarchy of learning skills (*Figure 13.1*) and

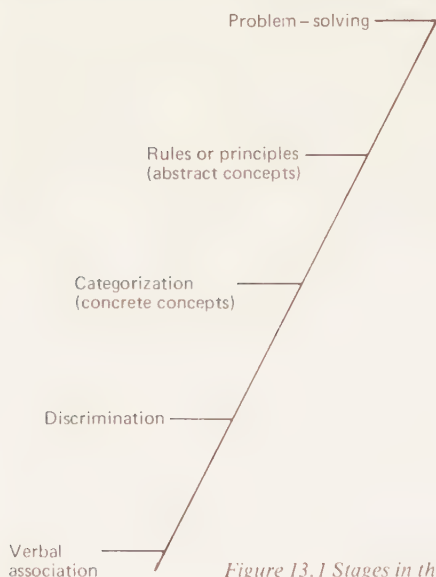


Figure 13.1 Stages in the hierarchy of learning (Gagné, 1970)

makes the important statement that unless 'learning' itself proceeds in the right order it will be ineffective. His stages are (from 4 onwards):

4. Verbal association
5. Discrimination
6. Categorization (concrete concepts)
7. Rule (or principle) learning (abstract concepts)
8. Problem-solving

Take the headmaster anecdote, for example. If we start as Gagné suggests, then the nurse would simply take the patient into the

bathroom and point out the salt and how much is measured into the bath. Next, the patient is observed preparing his own bath and learns to discriminate (stage 5) between the amount of salt needed for a full bath or a shallow bath. The only categorization (stage 6) which may occur is if the necessity for salt has been questioned and frankly answered by demonstrating options, such as the response that hypertonic salt probably cleans and dries open wounds, but adding that this has not been proved and it is likely that it is not necessary, especially if the wound is dry and clean.

The patient may then need to categorize the state of the wound as wet or dry, and articulate (stage 7) the principle of using salt in the bath. This has moved the learning to a problem-solving stage and it will depend on the individual how much progress can be made. It underlines, however, that it is central to learning to start with the specifics and move towards the principles, as and when the patient or student is ready.

Conditions for learning

It is important to understand concepts of perception, personal constructs, trial and error, imitation and motivation.

The nurse must be particularly aware of the problems of perception when they are limited by physical, as well as by psychological problems, such as blindness, deafness and other defects of the sensory nervous system. The more subtle communication through transference needs to be remembered, because the nurse/teacher is also some other person to the patient.

It is important to appreciate how one is being perceived. Formality, combined with an authoritarian approach, may cause a transference fantasy which is anti-task and learning will not then take place. On the other hand, uniform and formality may provide a security essential to learning. Preconception is more likely to occur than reality, at first. The more facts known about a person, the less transference occurs and the easier it is to influence the outcome. The learner will always perceive the teacher in the light of experience received within our 'society workshop' where values and personal constructs are formed (Bannister and Fransella, 1971). Patients who disliked school may find it difficult to learn, and those who see the nurse as an authoritarian figure may have considerable difficulties.

Motivation

Trial and error learning is often combined with the argument that 'practice makes perfect'. Unfortunately this is not always so.

Repetition of a skill is necessary for mastery, but the fundamental factors involved in learning and essential to a final satisfactory performance are: drive, response, cue and reward (Miller and Dollard, 1962). A drive is a strong stimulus which impels action. Pain is a primary drive. Anxiety and fear mirror pain and are known as secondary drives. Without drive one does not learn. Experiment has shown the importance of drive.

Stone (1929) investigated the problem of old rats appearing to be more stupid than young rats, because they learned more slowly in laboratory experiments. It occurred to Stone that mature animals kept underweight may not be starved as much as young growing animals, even though the latter were allowed to gain. When he took particular care to see that both the old and the young rats were motivated by a maximal hunger drive, the apparent stupidity of the old rats disappeared.

The relationship between drive and learning must be appreciated. If the patient is not self-motivated, it is imperative to stimulate him through providing answers to the secondary drives of anxiety, fear and social need, which are likely to be in evidence. This is difficult when dealing with depressed patients, especially if the nurse is able only to offer teaching which will help the patient learn to attain the best health possible in a given situation. It may be more opportune to provide learning through the family, where drive will be related to desire for approval. It is important to examine patients' secondary drives and match them with the learning required, as shown by the following anecdote:

A man, 40 years old, was admitted to hospital after a railway accident in which he lost both legs. The amputation operations were satisfactory but he refused to learn to use crutches. He was physically in good condition, but depressed, and no discussion could take place with either staff or family. After some weeks, three friends asked if they might take him for a drive in the country. This was agreed. The car was packed, with a barrel of beer and sandwiches. The patient sat in the back with the crutches he had never used.

The car stopped close to a field, and the friends moved the beer barrel some yards away under a tree and prepared the picnic. The patient was left in the car with the door open and invited to join the others if he wanted to. He did—and used the crutches for the first time. His social need to be alongside his 'pub' buddies and to be approved was very strong indeed. From that episode, learning started, and he was fitted with artificial limbs some months later.

Cues

A drive impels a person to respond. Cues determine when, where and how he will respond. It is important, in teaching, to arrange the situation so that the learner will make the correct response. An example of a cue might be an Indian Restaurant sign determining where someone seeking a curry meal would go. So, when we consider the patient and his learning needs, it is important to help him build a set of formal cues around the necessary response. For example, a meal may be the cue for a drug to be given before or after eating; a loose stool may be the cue to increase the *Isogel* (ispaghula).

It is important that the patient has a clear idea of what is expected of him in terms of drugs, dressings, injections, exercises or other necessary treatments. They should be placed within the total context of his disease so that he is able to recognize the meaning of the cue as it arrives, whether it be increased sugar in the urine of the diabetic, increased weight in the patient taking steroids, or the more complex observations required when discretion is given in home dialysis.

The cue is always associated with some form of pilot cue. Just as any large ship is brought into harbour by a small pilot boat, so a major learning opportunity is accompanied by a person. In this case, the person is a nurse, who, by reason of her prestige, will be imitated in her attitudes and methods. No amount of health teaching on smoking will have an effect if the teacher is known to smoke. Thus, the prestige of the nurse acts as a pilot cue. We are reminded by Smith (1979) that '... nurses are particularly negligent in this respect and, so far as smoking is concerned, their role as health role models is singularly lacking'. A survey conducted recently by the Office of Population Censuses and Surveys among health care profession groups showed that top of the smoking league were hospital nurses (48 per cent) and the clear runners-up were district midwives and health visitors (33 per cent). Both of these groups came bottom of the league of those who had stopped smoking: district midwives and health visitors (18 per cent) and hospital nurses (12 per cent). 'Of the nurses interviewed, 93 per cent accepted that there is a relationship between smoking and ill health, 88 per cent thought they could play an active part in antismoking education, and 74 per cent thought they ought to feel responsible for discouraging people from smoking. There seems to be a message here for nurses, particularly if they consider health promotion and health education important functions of their role' (Smith, 1979).

The pilot cue and the role model are often one, as shown by the following anecdote:

A patient had been shown how to carry out a dressing with

melolin. Three weeks after discharge she was seen in the outpatients department and discovered to have placed the melolin on the wound with the 'rough' side next to the skin instead of the 'smooth' side. When asked about this she said she had noticed that this was how the senior staff nurse did it and she had only been taught by a third year student. What responsibility each of our status symbols gives us.

It remains for the cue to be tied to the response. This is done by providing contiguity of experience and/or by judicial praise. Since 1898 it has been known that people tend to carry out those activities which have success associated with their results. This is called Thorndike's Law of Effect. The more experience the patient has in carrying out a technique and the closer each experience is to the next, the more positive the learning.

Although it is an unpopular thought, it is wiser to teach one student nurse a technique, such as catheterization, twice in a short time span, than to give one opportunity to two students. In the second event it is unlikely that effective learning will take place. Contiguity of experience is essential. If the task or response is not rewarded, the tendency to repeat it to the same cues is weakened. Pavlov (1927) called this process extinction. In the absence of reward, the acts which it is hoped will lead towards a reward are weakened, and finally become extinct. The reward may be simple judicious praise, which allows the patient, student or co-worker to bask in the relaxing sense of achievement and reduced anxiety that comes with praise or the cessation of criticism. The reward might be also the continuation of life itself.

The learner

In the past, the term 'learner' usually referred to the average learner. All things were measured against what the average learner would do, need, or be able to accomplish. It did not seem to matter that no such person existed. Students were all subjected to the same input and they succeeded or failed depending on many factors.

Now, with an increased awareness of cognitive processes and of those elements in the environment, or within the student, that affect the use of cognitive processes, educators are seeking ways to provide unique learning experiences appropriate to each learner and nurses in their teaching role should attempt to do the same. They will have no individual/groups that do not vary widely. Allsopp (1979) has dealt comprehensively with the matter of variables in health education and has pointed out the variety of people requiring teaching in the differing ethnic and social groups.

Townsend (1979) offers a wealth of information about the social and health circumstances of patients and clients. Knowing and understanding social and health problems helps us avoid teaching which is not relevant to the patient's environment. Advising daily baths when the patient has no bath will bring negative results.

The implications, that the nurse must help the patient with his feelings, need considering. We can have all the facts of why certain things should, or should not be done, and yet, day after day, go on behaving in the same way. No better example exists than overeating or smoking.

The nurse can give facts but, unless the patient is ready, he will not use them. A non-directive teaching-learning process is needed as an effective rehabilitative process. The nurse must work with the patient towards the goals. Working with people is not the same as 'doing' for the patient. We need to learn to listen very carefully and help the patient to hear what he is saying, so that we may help him explore his problems. To make these discoveries he needs to be free to express himself. The setting has to be permissive, otherwise the patient will be too busy learning the rules and not preparing for rehabilitation.

Principles of teaching

In discussing strategy for patient teaching, Jenny (1978) indicates that physicians in Canada are reluctant to recognize the value of the nurses' participation in patient education, yet evidence exists that nurses are providing more health education today than any other group (Somers, 1976). Wherever the truth may lie, it is apparent that there has been little examination of the principles of teaching related to patient care. Emotive words such as patient compliance are used.

Graham and Suppre (1979) set out some figures related to drug default but, while practical methods of preventing this are explored, little reference is made to patient education and scant exploration of communication. One study demonstrated the frequency of non-compliance (*Table 13.1*) and it was understood that failure to cooperate was often related to a failure to appreciate the aims and mechanisms of treatment.

Chaput de Saintonge (1978) states, 'It is only when the patient is taught about the disease as it applies to him and the ways in which he can manage his own problems that co-operation improves'. Assuming this to be true, and that the principles of learning have been applied, what teaching principles must be used? Effective teaching demands rapport, communication, objectives, planning, control of the environment, and evaluation. It may be described in

Table 13.1 The frequency of non-compliance (Chaput de Saintonge, 1978)

<i>Disease</i>	<i>Treatment</i>	<i>Non-compliance (per cent)</i>
Streptococcal pharyngitis	10 days' oral penicillin	45–90
Rheumatic fever prophylaxis	Oral penicillin	35–80
Glaucoma	Eye drops	60
Tuberculosis	Anti-TB drugs	40
Schizophrenia	Tranquillizers	52

the same way as the stages in planning a curriculum (*Figure 13.2*). This is a curriculum process ‘model’ showing the relationship between the important stages in the process. The problem initially needs diagnosis and it is important to distinguish between the obvious problem and the anticipated ones. It may be that a patient can be instructed accurately to give eye drops, but what about the family? Will anyone ‘take over’ and subsequently be less efficient? Will this be recognized by the grateful patient who will find it hard work to give self-care? What other problems may arise?

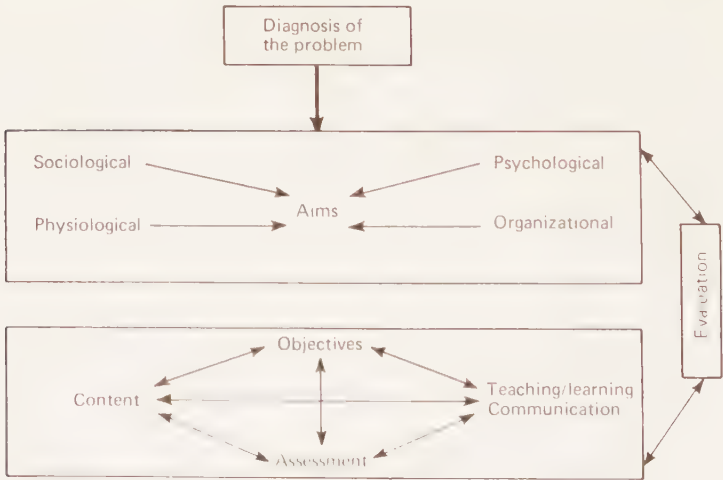


Figure 13.2 Stages in planning a revised curriculum (adapted from Allen and Murrell, 1978)

These points must be examined carefully in any teaching situation. The problem must be identified, and the aims or expectations we have of the learner must be determined. This will mean that certain factors must be explained—sociological, psychological, physiological and organizational. It will be seen that these overlap with the

learning process and that understanding these points is essential if learning is to take place.

For example, if the patient needs a daily bath after haemorrhoidectomy, it is essential to discover whether he has a bath at home, or where he could get one and whether he could afford to buy it. Will the organization of social services assist or not? What physiological defect may impede him? He may suffer from degenerative arthritis and therefore find the physical exertion of getting into a bath alone, too great. Can he afford adequate fruit and roughage in his diet to avoid constipation, to establish a regular daily bowel movement, and to prevent strictures and thus preserve the normal lumen of the anus? Drinking plenty of 'fluids' may not register as 'beer'—if he likes it! Will he be frightened to take the mild laxative if he continues to have pain?

Having explored the aim, the objectives must be described. The objectives give detail to the specific knowledge, understanding and skills which are required. When the objectives describe a change in behaviour they are sometimes called behavioural objectives. Objectives in curriculum planning have been developed from the work of Bloom, Bloom and Masia (1956) and Krathwohl (1964). Bloom deals with the cognitive domain, which relates to knowledge and psychomotor skills, and Krathwohl to the affective domain, related to feelings and attitudes. When educational objectives are described in a practical and detailed manner, it is then possible to determine with some precision those learning activities suitable for attaining an objective. The lack of explicit definition of educational objectives makes discussions on teaching methods and evaluation methods invalid and useless. The objectives need to be enumerated simply and precisely. For example, on discharge a diabetic patient should be able to:

1. Test his urine accurately with Clinistix
2. Record the results accurately
3. Judge the correct dose of insulin in relation to the urine test result
4. Describe a method of sterilizing syringe and needle
5. Clean the skin
6. Assemble syringe and needle
7. Draw insulin into the syringe
8. Give the injection satisfactorily
9. Feel comfortable in performing the skill
10. Show an interest in his disease process and adjustment.

Items 1–4 of this list relate to the patient's knowledge, items 5–8 to his skills, while 9 and 10 reflect his attitudes. This is a simple list and

may easily be improved. The more carefully the objectives are prepared, the more chance there is of accuracy and good ideas. Nurses should discuss the objectives with the patient, so that a plan may be made which is likely to be understood.

Purpose of teaching

The purpose of teaching is to facilitate learning (Mackenzie *et al.*, 1970) and it is necessary to fuse objectives to subject matter, as shown in *Figure 13.2*. The methods used should be justified, with reference to relevant research, if any exists. Teaching as one has been taught is not necessarily a good or effective method.

First, there should be a plan. Patient education may be noted in a Kardex system or in problem-orientated medical records, for example: 'Told shadow on chest X-ray. Investigations needed to find out cause. No mention of Ca. To stop smoking in case surgery needed' (McIntyre, Pugh and Lloyd, 1976). This ensures that there must be some communication with the patient. It implies the need for rapport so that factors may be discussed which might interfere with learning: this is called 'feedback'. The teacher should realize that it is easier to advise the patient to stop smoking than for him to do it, with the inevitable withdrawal symptoms, especially when anxiety and fear are present.

Sometimes, special effort and ingenuity are required to overcome language barriers, aphasia, deafness and loss of speech. It may be that, in dealing with the teaching of mentally handicapped patients, sign language might be learned by both nurse and patient to aid communication. In severe spasticity, when Makaton* cannot be used because normal dexterity is required, a modified form of Bliss*, with pictures of basic objects, might be helpful. Once rapport and communication are established it is possible to examine the methods of learning which might be used to achieve the objectives.

Methods of teaching

The message is conveyed in the medium, whether it be the role model or the teaching method of choice. Should it be formal or informal? If

* Makaton Vocabulary (Walker, 1978) is a sign system used for non-vocal children. It is used by schools catering for those children classified as educationally subnormal, autistic or suffering from speech defects. The sign system involves the use of hand postures so that, for the physically handicapped, a symbol system, such as Bliss, is more practical. Blissymbolics communication (Davies, 1979) introduced into the UK in 1973-74, is one of the alternatives for those unable to speak. Signing systems are inappropriate, as in cases of cerebral palsy, when there is poor hand function and when there is a necessity for the receiver to understand sign language. Blissymbols are easily learned, portable and inexpensive. The symbols are basically line drawings and resemble much of the early recorded languages of men. The patient who cannot read is

large numbers are being taught, then a lecture may be necessary. The disadvantages of this method are obvious, for although it might be used for mothercraft teaching, it keeps the student/patient in a passive situation, does not facilitate problem-solving, offers little, if any, indication of learning progress and does not allow for individual pace.

Small-group activities permit dialogue and enable different insights to be explored and evaluated. This is useful when teaching patient and relatives together, or when children are able to 'do things' together, such as cleaning teeth. Mostly one-to-one teaching takes place with patients, but it may be helpful to involve the family or other patients or Patients' Associations.

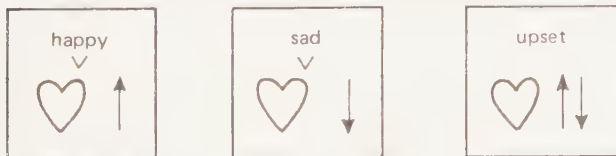
There are over 200 organizations in the UK alone, for patients and disabled people, whose interests and services vary enormously (Sayer, 1979). Some are willing to provide excellent literature, counselling and individual help and advice. A little forward planning and imagination can involve others with the teaching, so that the nurse, co-sufferer or co-helper may present different viewpoints to the patient who needs rehabilitation.

Some people do learn best through reading as it allows self-pacing, but the teacher needs to plan ahead so that questions may be dealt with, as well as asked, and so that knowledge of such things as diet, skin care and posture may be checked.

It is also important that all surgical appliances are fully understood. Demonstration and practice is essential. It is useless for the nurse to assume that she knows how to teach a patient to wear a belt for a lumbar disc lesion, if she has not explored the problems associated with buckles and stockings which may have to be worn by the patient, instead of tights. This is an opportunity to ask the physiotherapist to help with the teaching plan. Too many nurses 'go it alone', feeling that they should be omniscient.

Charts, posters and diagrams may be used. Posters and jingles such as 'coughs and sneezes spread diseases' are all simple techniques for transmitting messages relating to health, and they continue to play a part. However, national media campaigns are

often able to identify the primitive symbolic representation. For example:



denotes feelings of 'the heart' (Blissymbolics (1979), Communication Institute, Toronto, Canada).

being used increasingly, with the cooperation of health professionals, to promote health because, although one-to-one teaching is of value when the patient is in hospital or visiting his GP, additional methods are necessary.

The Health Education Council and other similar organizations are able to give information on techniques, which may also stimulate ideas for use in the hospital ward, doctor's surgery or community clinic. If video equipment is available one can devise teaching programmes, particularly related to skills like 'injection-giving' or 'wound-dressing', which may precede personal one-to-one teaching, and this can be followed up in the day room or 'lurking area' of the clinical unit. Nurse-tutors may profitably be involved in such recorded lessons, which constitute teaching for tutors and students alike, and are beneficial to patients. In addition, where there is a hospital radio service, humour and jingles may be used to teach broad principles of health care.

Checking the teaching

Tapes may be used to check teaching, and it is very valuable to record a teaching session. Points which had been omitted, were equivocal or inaccurate, may subsequently be considered. The recording should be made at the first session so that clarification and amendments can be incorporated quickly. It is always surprising how much can be learnt from this, which is not so much an exercise in humility as in commitment to detail in order to avoid error. It is not practical to videotape a teaching session, though from time to time, if this can be arranged, it provides a valuable check of body language as well as of voice tone, which in themselves give a message and may act as built-in saboteurs!

Trigger Films (1979) are short and non-directive and are intended to stimulate discussion. They may be used for teaching about dental care, sexually transmitted diseases, mental health and smoking. They are valuable for professionals working within the community or in schools, particularly when working with teenagers or volunteers. The films present the daily living dilemma. They do not express rights or wrongs but are directed towards attitudes and behaviour, and allow attitudes to be questioned and new ideas introduced through discussion. The audience can be involved in a process of thinking, discussion and personal decision-making.

Evaluation of training

Figure 13.2 shows clearly that evaluation is part of the learning cycle, which begins with the objectives, but finishes with a reappraisal and revision of objectives (Allen and Murrell, 1978).

The techniques of measurement and evaluation are not limited to paper and pencil tasks. Any valid evidence that helps teacher or student to understand himself better is worth while. Attempts should be made to obtain all such evidence by any valid means.

Evaluation should be measured against the objectives. We cannot measure something unless we have defined in advance what we wish to measure. Evaluation should be 'continuous' or formative, so that at each point success is measured and readjustments are made. Formative evaluation measures progress and, in patient teaching, does not proceed to summative evaluation or rank-ordering, as with students.

It might be threatening to set a patient multiple-choice questions to test cognitive objectives, but simple questions may be asked, to check recall. These questions may be prepared carefully by the ward or community team, with the objective of a simple reply. For example, it may be considered important for the patient to avoid eating certain foods. A written list should be given to the patient and verbal checks made at predetermined intervals. Over-learning must occur if material is to be permanently understood. Replay is an essential way of improving memory and assists with assessment. Both the affective and psychomotor domains are best assessed from direct observation and inference. The teacher stands or falls by what his pupil does. For example, is the patient able to insert a catheter into a uri-bag without infecting the catheter? It may also be that the patient's attitude has been one of careless abandon. What efforts were made to ensure that this attitude was improved before discharge? Was the patient seen to become more careful in the handling of his catheter, when directly observed *and* when indirectly observed?

Although valid and reliable tools may not yet have been produced for patient teaching, and are open to much debate in any form of evaluation, it is important to be creative and imaginative in an effort to assess the learning which has taken place. The teachers/nurses will then become better teachers. Unfortunately there is little monitoring of the patient's achievement or otherwise after discharge. More specifically, the nurse who teaches, rarely has feedback on the success of her methods, unless the link with the community or outpatient department is tightly forged; regrettably, this is rare. The district nurse, health visitor or public health nurse may grumble about the way in which a patient has been taught, but rarely is the problem studied together with her hospital colleague.

This is something we would do well to consider, so that the learning/teaching process of patients and clients might become more precise, yet not pedantic.

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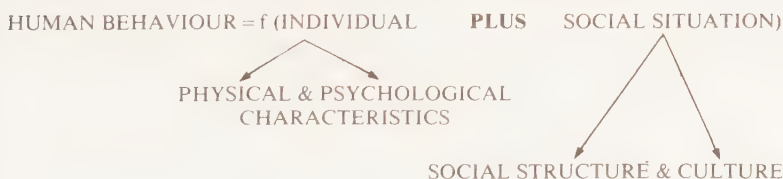
A sociological perspective

CAROLINE COX

In this chapter I will attempt to show that sociology has something to offer to those working in health care. First, a general case is made for sociology; then a brief account of the nature of sociology is given, which may be helpful to readers who have not studied the subject; next, examples of relevant sociological studies are described. Finally, conclusions are drawn which will make some connections between a sociological approach and the nursing process model of patient care.

Why sociology?

Nursing, midwifery, health visiting—as every reader of this book will know—are fundamentally concerned with *people* and with *human behaviour*, in health and in illness. As professionals, we wish to be as effective as possible in the provision of health care and in the fulfilment of professional responsibilities. We therefore need to have an informed awareness of as many factors as possible which affect the aspects of human behaviour with which we are concerned. These can be summarized in the form of an ‘equation’:



In this equation, ‘f’ stands for ‘the interrelationship between’ the individual and the social situation. It reminds us that, in any situation, people’s behaviour will be a result of the interplay between their physical and psychological characteristics and the nature of the social situation. This may consist of a specific setting, such as a hospital ward, or it may involve the more intangible but no less

important dimension called 'culture', which refers to the realm of ideas, beliefs and values. Although this may seem very abstract, it can be important—for example, sociological studies have shown how the cultures of different ethnic groups encourage people to perceive and to respond to pain and illness in very different ways.

Thus, this 'equation' helps us to bear in mind the simultaneous operation of factors at all four levels—although obviously there may be times when one has priority over others. For example, in the case of a patient with renal colic, his pain may be so overwhelming that the overriding priority is the *physical* need for pain relief. At other times, one may need to regard the *psychological* dimension as the priority, as with a patient who is in a state of acute anxiety or fear. However, these priorities do not occur in isolation, and it is in the consideration of the influence of the *social situation* that sociology may make its contribution.

Before giving some concrete examples of sociological studies which may help us to understand the influence of social structure and culture on the provision of health care, it may be helpful to say a few words about sociology itself.

What is sociology?

Sociology is a relatively young subject compared with the natural sciences. The writers who are generally recognized as its 'founding fathers', such as Karl Marx or Max Weber, were writing in the latter part of the nineteenth century or the early years of the twentieth century—so the subject is barely 100 years old. It also deals with subject matter of enormous complexity: human behaviour, not just at an individual level—complex and challenging as that is—but as it is manifest in the enormous diversities of different societies and at different times. Some sociologists attempt to portray the characteristics of entire societies—producing, for example, portraits of entire political, economic or health care systems; this approach may be called 'macrosociological'. Others may adopt a different perspective, preferring to focus in greater detail on particular groups within a society and the types of social relationships which occur within these groups. This approach is called 'microsociological' and examples include, as we shall see, studies of professional–patient relationships, or ways in which particular kinds of patients may be cared for.

Objectivity and subjectivity

Another way in which sociologists differ in their approach to their work is the extent to which they concentrate on those aspects of

human experience and behaviour which are relatively 'objective' or 'subjective'. Those who emphasize the former will tend to take more quantifiable and tangible kinds of phenomena as their starting point, such as the distribution of wealth and poverty or of disease, while the latter will tend to start with the more qualitative features of human life, such as religious beliefs. Clearly, the approaches merge—for example, the sociologists who begin with the more 'objective' data may then consider their effects on people's experience; while those who start with more 'subjective' phenomena may develop their analyses to take account of the social structures which provide the context for the ideas, beliefs and experiences they portray. However, the differences in starting points and in the types of data reflect significant differences in assumptions about the nature of sociology and in research methods, which can be confusing to the newcomer. It may therefore be helpful to portray these different approaches in the form of a diagram which can serve as a 'map' of the sociological terrain; one can then locate particular studies and see their relationships to each other. (Figure 14.1).

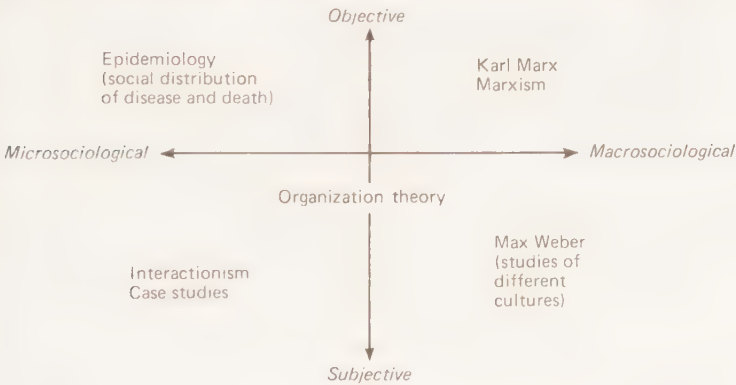


Figure 14.1 Different approaches in sociology (adapted from Cox (1979), *Journal of Advanced Nursing*, 4, 237–252)

Limitations

A point which requires emphasis is that sociology consists of a number of *different* perspectives, rather than a *single* approach. Each approach may have something useful to offer, but in our present state of knowledge, it can only give an incomplete and limited account of social reality. Therefore, I believe that sociologists should be very honest about the limitations of their work, and humble in the presentation of their findings—given the complexity of the reality they are trying to understand and the

inevitable shortcomings in their analyses. They should take great care to avoid dogmatism and doctrinaire conclusions. Unfortunately, they do not always do this and three warnings may be helpful.

First, J. Rex, a professor of sociology, has pointed out that many sociologists are so politically committed that the subject has become an arena for internecine warfare which is so bitter that he describes it as 'British Sociology's Wars of Religion' (Rex, 1978).

Secondly, Brian Heraud, also a sociologist, commenting on ways in which some sociologists have written about the professions, observes that they tend to '... reflect an attitude of arrogance and disdain for the day-to-day work of professionals and for the decisions which have to be made by them ... decisions by which such professionals have to stand or fall, while the sociologists may remain safely on the sidelines' (Heraud, 1979).

Thirdly, sociologists often pride themselves on being 'critical', arguing that they can stand back from the phenomena they are observing and disclose the hidden assumptions underpinning other people's lives and work. But often, this appears as cynical, carping criticism. To quote Heraud (1979) again, '... the weakness shows itself particularly in the contemporary analysis of the professions, where the sociologist takes a very serious view of his role as everlasting social critic by ignoring or distrusting any of the positive, pragmatic or optimistic forces or expressions of opinion in such institutions or in the wider society ...'. He concludes 'The contradictions of the "critical sociologist" stance are numerous, not least how he himself has arisen from the mire he describes, often lavishly if not lovingly supported by universities, research foundations and other educational institutions, most of which he castigates as part of "the system".'

The result of these tendencies in sociology is that many people outside the subject may feel justifiably perplexed, confused or angry when they read some sociologist's work, and they may feel like rejecting it outright. Perhaps some work offered in the name of sociology deserves this response. However, it would be a pity if *all* sociology were to be condemned because, as I will try to show, I believe it has some useful contributions to make to the more effective provision of health care.

Useful contributions

I suggest that health care professionals should approach sociology with a frame of mind consisting of two attitudes:

1. A willingness to consider seriously the findings and

recommendations of sociological studies, even if they challenge some cherished assumptions and are somewhat uncomfortable—provided that they are based on research which is valid and that the findings are presented in an honest and balanced form

2. A healthy scepticism which looks critically at the assumptions which underpin any sociological study, the ways in which the data have been collected and analyzed, and, most important, the ways in which inferences are drawn. If experienced health care professionals feel that it leaves something to be desired, they should challenge it and expose its defects. There has been a tendency for professional practitioners, who are experienced in their own fields, to feel insufficiently confident when confronted with the work of sociologists to question it, even though they are concerned about its deficiencies. I believe that this is worrying. Sociologists influence policy in health care: it is therefore incumbent upon others who are also concerned with health care, to ensure that the influence of sociology is as helpful as possible in promoting the quality of that care. Also, writing as a sociologist, I believe that the subject itself will benefit by criticism from people who share some of the same interests but can offer critical feedback based on their own expertise. So I hope to see a growing dialogue between professionals such as nurses, doctors, midwives, health visitors and other health care workers and sociologists, in which all help each other to think critically and constructively about their own roles and their own contributions to health care—for it is here that our endeavours overlap.

Examples of sociological studies relevant to health care

As it is possible to give only a very small selection of examples of sociological studies relevant to nursing and health care, references for further reading are provided at the end of the chapter. Here, examples have been chosen in order to try to give a 'feel' for the kind of information and insights which sociology can provide, ranging from macrosociological to microsociological approaches. They include studies of:

1. Changes in the content of health care and the social context in which it is provided
2. Related changes in the organization of the health care professions

3. Interactions between professional and patient or client
4. The management of different types of health care problems, including sociological studies of the nursing care of the chronic sick, the elderly and the dying
5. The experience of being a patient
6. Cultural variation in the perception of, and response to, pain and illness.

The changing content and context of health care

The twentieth century has seen dramatic changes in the incidence and prevalence of many diseases. It is now possible to prevent or to cure illnesses which, only a few decades ago, would have been fatal. Most notable has been the virtual eradication of many infectious diseases—for every one person who dies from a disease in this category now, 60 would have done so 40 years ago. Other advances, in preventive health, in therapeutics and in surgery, mean that many people now survive to middle or old age who would previously have died in infancy, childhood or young adulthood.

Pinker has considered some of the implications of these changes. In *The Future Role of the Nurse* (Pinker, 1978) he highlights, among other issues, the implications for those engaged in community care. He suggests, for example, that the policy of encouraging the care of the disabled, the chronic sick and the mentally ill in the community wherever possible, could result in considerable hardship for families or neighbours and a danger of loneliness and isolation for the patients themselves. Resource implications include the need for a greater investment in community health care workers of all kinds.

A different aspect has been highlighted by Tudor Hart, who has argued that our present health care system is not providing health care as effectively as it should, because of the operation of what he calls 'The Inverse Care Law' (Tudor Hart, 1971). He claims that the most deprived places, such as inner city areas, are least well provided for in the quality of facilities and the availability of professional services. For example, they tend to have a higher proportion of lock-up surgeries, which may mean that it is difficult for people to obtain medical help in emergencies. If one imagines the plight of an elderly woman whose husband has a coronary thrombosis in the middle of the night, living in accommodation without a telephone, who has to go out to ring for help and who finds that the public call-box has been wrecked by vandals, one can appreciate some of the effects of differential provision of, and access to, health care facilities.

A third example of a macrosociological approach which is critical of the way in which the health care system is operating in our kind of society is provided by a Marxist writer (Navarro, 1976). He is

concerned about the effects on health care of the capitalist mode of control and the role of state intervention in a capitalist system. However, what often tends to be lacking in Marxist critiques of health care in capitalist societies is a comparably critical evaluation of the provision of health and welfare services in socialist societies. As Halmos (1976) pointed out, it would be good sociological practice to analyze the extent to which health and welfare problems are solved in societies which have undergone socialist revolutions. In a review of a relevant book he writes '... there is a complete silence on the failures of the so-called socialist welfare states in the areas so often featuring in the critique of the capitalist welfare States: suicide, drug addiction, alcoholism, crime, mental illness, and so on, the catalogue of 'social problems' recognized by the 15 or so contemporary socialist States, are just as frequent in these States as they are in capitalist ones. A book devoted to highlighting the failure of the British welfare State since 1955 and *prescribing a socialist revolutionary answer for this failure* has no business to be silent about the record of the socialist precedents in this area of human experience ...'. There is therefore a need for more thorough comparative sociological analysis of health care systems in different types of social, economic and political systems so that we can assess the relative merits and disadvantages of the available alternatives.

The organization of health care professionals

There are several approaches available here. One of the most influential has come from the USA in the form of work by Freidson (1970) who is particularly critical of the 'professional dominance' of the medical profession. He argues that doctors may exploit their power to the detriment of their patients and other professional colleagues. He is also concerned about potential conflicts in the doctor-patient relationship—resulting from differences in knowledge, attitudes and expectations.

A different kind of approach, which is more microsociological, is found in Towell's *Understanding Psychiatric Nursing: A Sociological Study of Modern Psychiatric Nursing Practice* (Towell, 1975). Here, the author gives an account of psychiatric nursing in its everyday detail. He depicts the problems, challenges and satisfactions, from firsthand experience, derived from a personal case study. These approaches merge into the third area, described next.

Interactions between professional and patient or client

There have been a number of studies focusing on the interpersonal

relationships between professional and patient or client. A book which illustrates the advantages and limitations of this approach is Stimson and Webb's *Going to See the Doctor* (Stimson and Webb 1975). It provides a wealth of detail about the relationships between doctors and patients and describes patients' own experiences very vividly. As Stacey (1978) says, 'The insights which emerge from the conversations among patients are important. Some hold it against such works that one does not know how representative the findings are. This is to mistake the purpose. If such relationships can occur at all or anywhere, they are part of what constitutes the totality of the doctor-patient relationship. It is necessary to discover the character of such relationships before one can measure the prevalence of particular types.'

Another study in this vein was undertaken by an enterprising medical student (Boyle, 1970), who analyzed the extent to which doctors and patients were 'talking the same language' (Figure 14.2). He discovered that many patients' knowledge of basic anatomy was

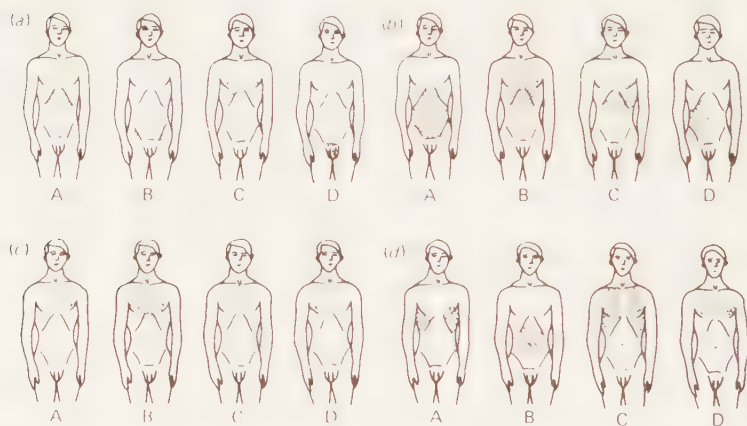


Figure 14.2 Doctors' and patients' 'body language'. (a) **Distribution of positions of the kidneys.** A: 52 patients (46.0%), 35 doctors (100%) χ^2 29.05; DFI; $P < 0.0005$ (doctors > patients). B: 55 patients (48.7%), 0 doctors. C: 2 patients (1.8%), 0 doctors. D: 4 patients (3.5%), 0 doctors. (b) **Distribution of positions of the stomach.** A: 67 patients (58.8%), 0 doctors. B: 22 patients (19.3%), 0 doctors. C: 23 patients (20.2%), 35 doctors (100%) χ^2 43.21; DFI; $P < 0.0005$ (doctors > patients). D: 2 patients (1.8%), 0 doctors. (c) **Distribution of positions of the heart.** A: 47 patients (41.2%), 2 doctors (5.7%). B: 17 patients (14.9%) χ^2 5.07; DFI; $P < 0.025$ (females > males), 0 doctors. C: 48 patients (42.1%), 33 doctors (94.3%); χ^2 25.3 $P < 0.0005$ (doctors > patients). D: 2 patients (1.8%), 0 doctors. (d) **Distribution of positions of the lungs.** A: 36 patients (33.3%), 0 doctors. B: 2 patients (1.9%), 0 doctors. C: 55 patients (50.9%), 35 doctors (100%) χ^2 25.24; DFI; $P < 0.0005$ (doctors > patients). D: 15 patients (13.9%), 0 doctors

(understandably) very limited and that consequently their ideas of the location of various organs such as kidneys, thyroid, lungs or stomach were often different from the doctor's. There was thus a danger of misunderstanding in discussions concerning diagnosis and the interpretation of symptoms or other cues. This imaginative study was relatively easy to do, and could be replicated by other health care professionals, such as nurses or health visitors, in hospital wards or in clinics in the community. This could be very worth while, because accurate communication is vital for the provision of effective health care and health education. (It is also interesting to note that there was not always agreement among the doctors concerning the precise location of an organ!)

The management of different kinds of health care problems

There have been many studies of the care of patients with particular types of illness, handicap or dependency. Three examples must suffice: the care of the chronic sick, of the elderly and of the dying.

Care of the chronic sick

A thought-provoking study of the care of the chronic sick can be found in Miller and Gwynne's book *A Life Apart* (Miller and Gwynne, 1974). This is an account of a pilot study of residential institutions for the young chronic sick and the physically handicapped. The authors describe the models of care which are used by the staff, using provocative terms: the 'Warehousing Model' and the 'Horticultural Model'. In the former, where there was a high proportion of trained nursing staff, the outlook and regime resembled that of a hospital. There was a general acceptance of the patients' dependent status. However, the authors of the study point out that, in hospital, the patient's reduction to a state of dependency is usually a means to an end: restoration to a role of normality, or as near normality as possible, in the outside world. However, this may not apply to the residents of these homes and thus the balance between dependency and attempts to retain independence needs careful consideration. The theme recurs in their analysis of the alternative approach, the 'Horticultural Model', which was associated with a preponderance of untrained staff. Here, there was greater emphasis on the encouragement of independence with the provision of maximum opportunities for residents to develop their capacities. The norm was thus one of achievement, although, given the condition of some of the patients, it tended to be 'an aspiration rather than a reality' and could result in stress for some of them if,

for example, they were suffering from degenerative disease and found it difficult to meet the staff's expectations of independence. The authors also describe the patients' social relationships, pointing to the high proportion who were single or who had been divorced or legally separated, and the prevalent taboo against marriage between residents. They even conclude that admission to a residential institution may amount to 'social death' for some of the patients. As Smith (1976) points out in *Sociology and Nursing*, whatever the limitations of this pilot research project, it provides '... administrators with much food for thought', and '... researchers with some challenging topics for further investigation'. Before leaving the problems of the chronic sick, reference must be made to another study: *The Care of the Long-Term Sick in the Community* (Kratz, 1979). This book describes dilemmas facing nursing staff, and others, who care for those patients in the community who are suffering from cerebral vascular accidents. It highlights important variations in the type and quality of nursing care provided for these patients, which are also food for thought.

Care of the elderly

Sociological studies of the care of the elderly include the famous book *The Last Refuge* (Townsend, 1964) which gives a dismal account of the life of many elderly people in homes for the aged. The inside cover says: ' "Grim and sombre"'. This was the first impression that Peter Townsend had of the Victorian workhouse which had become an Institution for old people . . . frightful overcrowding in sparsely furnished dormitories. Day rooms bleak and uninviting in which sat watery-eyed and feeble men, their spirit and pride drained away by the hopelessness of the surroundings: the shocking lack of privacy . . .'. The book makes sad reading, and one might have hoped that during the time which has elapsed since it was written, all the situations it portrays would have been remedied. Without in any way denigrating improvements that have been made, we must still feel concern over the fact that some of the problems highlighted by Townsend are still with us.

Care of the dying

The care of the dying has also been studied sociologically. Perhaps two of the best-known authors in this field are B. Glaser and A. Strauss. In one of their works (Strauss and Glaser, 1975) they describe different dying 'trajectories' and their implications for the care of the patient and his relatives. For example, the trajectory of a

slowly approaching death may require great sensitivity and delicacy on the part of nurses—especially if there is uncertainty about how much the patient and relatives know, or should be told. Another study, *On Death and Dying* (Kubler-Ross, 1969), describes different stages through which dying patients may pass, including those of denial, anger, resentment, depression and acceptance. Each calls for different responses from nurses, who may need to be sensitive to the changes and to adjust their responses accordingly. Studies such as these may provide insights which can contribute to our understanding of the experiences of dying patients and their relatives, and so enhance the quality of care we can provide. They may also be useful bases for discussion for medical and nursing students, helping them to confront the problems of the dying patient, and their own problems in coping with death and bereavement.

The experience of being a patient

At the extreme 'micro' end of the macrosociological–micro-sociological continuum is work which uses an intimate case-study approach. Here, the sociologist becomes closely involved with the people and situations he is studying. Sometimes, this entails interviews and/or observation; at other times, the sociologist may describe his or her personal experiences. An example of the former approach is found in *Studies in Everyday Medical Life* (Wadsworth and Robinson, 1976), in which several essays give detailed accounts of patients' experiences. However, there is always the danger that the sociologist who tries to present the patients' point of view may unwittingly distort or misrepresent it. This is because, however hard the sociologist tries to identify with the patient, he is still inevitably perceiving the situation through his own eyes—and selective perception must operate: no one can observe and describe a social situation in every detail and with complete objectivity. Any case study account will therefore bear the marks of the personal interests and attitudes of the sociologist who undertakes it. This is why, perhaps, the second kind of case study approach may be more 'authentic'—where the sociologist is describing his or her own personal experiences, instead of acting as an intermediary. An example of a study of this type is Roth's account of his experiences as a patient with tuberculosis, where he gives a very graphic first-hand description of life seen through a patient's eyes (Roth, 1963).

Another book which adopts the same approach is *Medical Encounters* (Davis and Horobin, 1971). Here, a number of sociologists give their own versions of their experiences with health

care professionals. However, as Stacey warns, '... social reality is necessarily experienced differently by one trained in sociology from one not so trained' (Stacey, 1978). Thus here, too, we need to remember the inherent limitations of sociology, as well as appreciating the insights which it may give us.

Cultural variations in the perception of a response to pain and illness

This last example is concerned with the influence of culture on people's perceptions of, and response to, illness and pain. A number of sociological and anthropological studies have described the different ways in which people from different ethnic groups tend to react to pain and illness, and anyone who has nursed patients from different cultural backgrounds will have noticed this. An American study, *Cultural Components in Response to Pain* (Zborowski, 1952), is equally relevant on both sides of the Atlantic. The author describes how patients from three different ethnic groups, 'Old American' (i.e. from an Anglo-Saxon background), Jewish and Italian patients behaved when suffering from similar physical pathological conditions. The 'Old Americans' tended to adopt a 'stiff upper lip', to be relatively inhibited and to hide their emotions. In marked contrast were the Jewish and Italian patients: they behaved very emotionally, tended to exaggerate and were highly sensitive. But although their ostensible behaviour was very similar, there were differences in their attitudes to their pain and illness: the Jewish patients tended to be very anxious about the effects of their illness on their families and their jobs, while the Italians appeared to be overwhelmingly concerned with the immediate relief of pain. As sociologists or as nurses, we do not need to commend or to disapprove of the different ways in which various cultures predispose people to respond to pain and illness—there may be advantages or disadvantages in each cultural approach to these situations. However, we need to be aware of the differences so that we can help people from different cultures as effectively as possible. For example, if the Anglo-Saxon tradition encourages stoical behaviour and a reluctance to ask for help, say in the form of analgesics, we may need to be aware of unvoiced needs and to offer help even when it is not requested. Alternatively, if other cultures encourage patients to be less inhibited, and more imperious or demanding, we need to avoid a tendency to irritation which may be aroused by their failure to conform to what we, in our culture, may think of as 'good patient behaviour'. Thus, awareness of such cultural variations may help to forestall misunderstanding and to enhance our ability to meet patients' spoken and unspoken needs.

Conclusions

This overview has attempted to illustrate some of the ways in which sociology can illuminate our understanding of certain aspects of human behaviour in times of illness and stress. It is hoped that the selection succeeds in showing that there are many ways in which sociology can offer information and illumination to health care professionals. We may highlight two kinds of contribution.

First, in general terms, sociology may promote a more critical and evaluative approach to established practices: it is a critical and radical subject in the sense that it may challenge tacit assumptions and question tradition. It may, therefore, sometimes make us feel uncomfortable. But, provided that we can remember sociology's limitations, it can be salutary and we may find it helpful to be encouraged to think systematically and critically about the way we fulfil our professional responsibilities. Secondly, and more specifically, sociological insights may have some contribution to make towards the implementation of the nursing process model of patient care by highlighting the social and cultural factors which we should take into account in the formulation of the plan of care and the assessment of its effectiveness. To take the wheel full circle and return to where we began: human behaviour is a product of the

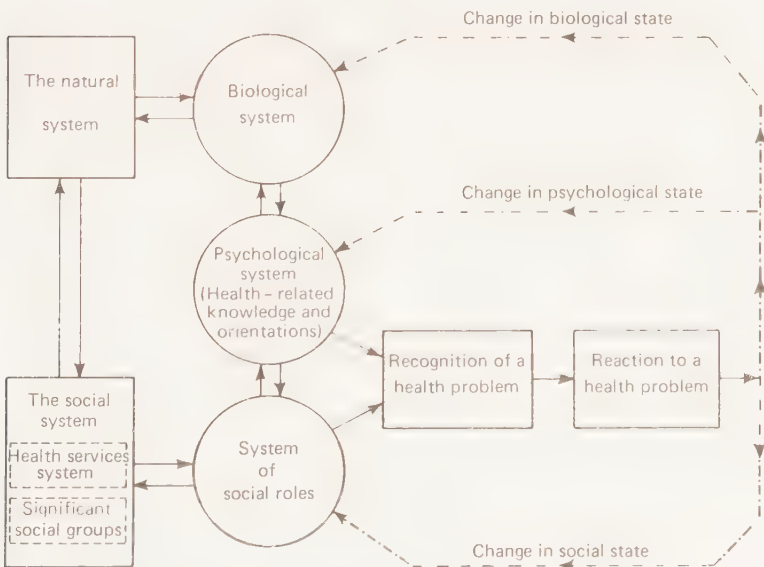


Figure 14.3 Conceptual framework of illness behaviour

interplay between biological, physical, psychological, social and cultural factors (*Figure 14.3*). We need to consider them all, if we are to provide comprehensive health care. This is why sociology, if used with discernment, can help us to promote sensitive and appropriate patient care. This is the justification of its relevance for nursing. We can ask no more and should expect no less.

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Nursing and economics

LISBETH HOCKEY

The purpose of this chapter is to make a case for economic science as an important component in the mix of disciplines which make up nursing science. The subject matter is developed in three sections:

1. The subject area of economic science
2. Some basic economic terms, concepts and theories
3. The relevance of economics to the provision of health care and its contribution to the study of nursing.

The subject area of economics

The subject area of economics is extremely wide and includes an ever-increasing number of specialties, such as monetary economics, industrial economics and welfare economics, of which health economics is a sub-specialty; there are many others. The above specialties are examples of applied economics. Economic theory tends to deal with the academic and more abstract aspects of the science, which are then applied to the real world. There is, therefore, a close relationship between the theory of economics and its application; they are interdependent.

For the purpose of this chapter the generic core of economic science is emphasized, at the expense of specialties within it. It would be neither possible nor helpful to attempt an exposition of economic science: it would have to be so superficial that it would lead to confusion and obscurity. As the chapter is intended to illuminate rather than obscure the contribution of economic science to the study of nursing, only a very few selected concepts and theories of economic analysis are referred to.

Probably the easiest way to introduce the economic perspective is to indicate the type of questions economic science attempts to answer: for example, what is inflation and why do we have periods of inflation alternating with periods of relative price stability? What is money and how is its flow in the economy determined? What is a balance-of-payment crisis and what makes some countries more

vulnerable to it than others? What factors determine unemployment? What determines the level of wages? How do market forces operate? What are the effects on a country's economy of nationalized industries, of monopolies, of cuts in public spending? What is the basis of resource allocations? How can economies of scale be achieved? Those are just a few randomly selected questions which are the concern of economists. The relevance of these concerns for nurses as responsible citizens and as members of the health professions must be evident. The relevance is increasing in proportion to the level of achieved professionalism and to the potential of decision-making. Thus, nurses who wish to claim professional status and who wish to take an informed part in decision-making, cannot escape the need to develop an economic awareness.

Macroeconomics and microeconomics

Leaving aside the many subject specialties within economic science, it is pertinent to distinguish between the fields of macroeconomics and microeconomics, although the boundary between them is blurred. In principle, the two fields tend to deal with their respective subject areas in different ways, and to apply different theories. Microeconomics is concerned with a detailed study of the working of individual markets and of the relation between these markets. The central problem is that of the allocation of scarce resources between alternative uses, which, in turn, is related to the problem of the determination of prices (or costs) and quantities in all the markets of the economy (Lipsey, 1966). The economy of any developed country is, however, an extremely complex mechanism which has as many parts. Macroeconomics concerns itself with the relationship between aggregates and the calculation of national averages. Broadly speaking, macroeconomics is the study of the aggregated behaviour of large groups of households, firms, industries, markets, etc. Macroeconomics is based on the assumption of stable behaviour patterns at the aggregate level. It has to make such an assumption, because a detailed study of the interrelationship between all individual markets and other economic units would be neither possible nor helpful. The complexity of such a study takes it outside the present state of knowledge, and the length of time necessary for it would render the resulting information of little use in influencing policy.

The basic problem in microeconomics is the determination of the structure of relative prices: the basic theory is that of demand and supply. The basic problem in macroeconomics is the determination

of the flow of income: the basic theoretical structure is the model of the circular flow of income (Lipsey 1966).

Positive and normative economics

Another distinction within the overall subject area of economics is important—that between positive and normative economics. In short (and grossly oversimplified) positive economics is descriptive, while normative economics is prescriptive. The importance of the distinction lies in the relative contribution of value judgments. Although, as a social science, no part of economics can be totally value-free or objective, positive economics is based on a mathematical foundation which removes some of the subjectivity within it. Positive economics uses mathematical formulae and conceptual models to demonstrate the relationship between economic variables; however, the variables themselves are determined by social behaviour. For example, a graph can be plotted showing the relationship between the price of, and the demand for, a good. *Figure 15.1* illustrates the relationship between demand for a

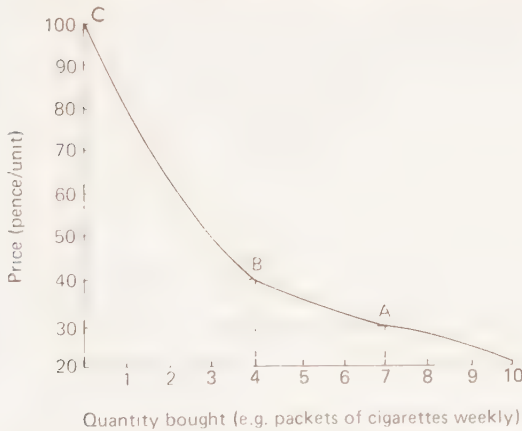


Figure 15.1 Example of a relationship between demand for a non-essential 'good' and its price. Each point on the curve demonstrates the quantity bought at a given price, e.g. at (a) 7 packets of cigarettes at 30 pence; at (b) 4 packets of cigarettes at 40 pence; at (c) no cigarettes at all at 100 pence

non-essential good, and its price. In the case of a good which is not essential, the demand falls as the price rises. Positive economics can calculate the impact of this relationship on other economic forces mathematically; however, the initial phenomenon, the 'fact' that

people tend to buy less of a good when it becomes more expensive and is not essential to them, is based on observation of human behaviour in the first instance and human behaviour is, by definition, subjective.

The explanatory power of positive economic theory tends to be related to the setting in which it was developed: the predictive potential of economic theory tends to be prefixed by terms such as 'all things being equal', often expressed as *o.c.p.* (*omnis ceteris paribus*) or simply *o.p.* Normative economics relates economic analysis to economic policy. It does not merely describe economic relationships and predict the likely effect of a change in one economic variable on another, it makes recommendations as to what *should* happen; it determines policies or, at least, advises policy makers. Most governments have economic advisors with this particular function. It is important for all policy makers, which includes nurses in administrative positions, to recognize the potential contribution *and* the potential power of economists and to understand the basic premises on which their science is based.

Some basic economic terms, concepts and theories

Like all disciplines with a defined body of knowledge, economics has developed its own technical terminology, its own concepts and theories. It is true that economists might make a more sustained effort to avoid unnecessary technical terminology, defined as jargon, and also to explain essential technical terms more clearly. However, if economic science is considered relevant to health care and to a study of nursing within it, some attempts must be made by health professionals, including nurses, to understand economic language. Many simple texts are available to help the novice who wishes to pursue a basic study of economics, and a brief bibliography is provided at the end of the chapter. However, in order to demonstrate the relevance of economics to health care and to a study of nursing, some terms, concepts and theories are explained below.

Economics

As mentioned at the beginning of this chapter, economics deals with a wide variety of questions and problems. The terms 'economic' and 'economical' in common parlance are misleading, as they tend to refer merely to cost. Many definitions of economics have been offered, for example: the study of wealth; the study of men in their

ordinary business of life, earning and enjoying a living; the study of those activities which, with or without money, involve exchange transactions among people. The definition suggested by Samuelson (1964) seems helpful. He defines economics as: '... the study of how men and society *choose*, with or without the use of money, to employ *scarce* productive resources to produce various commodities over time and distribute them for consumption, now and in the future, among various people and groups in society'. Health care in general, and nursing in particular, are commodities consumed by patients and clients.

Economic science, not unlike nursing, borders on and overlaps with many other important academic disciplines, such as political science, anthropology, social psychology and sociology.

Cost

In common speech, cost tends to refer either to the total cost of a good or a service, or to the average cost. In economics many different types of cost are used, some of which are in everyday use; for example, capital cost, total cost, current cost, average cost. The meaning of these terms in economic science is not substantially different. It is worth pointing out, however, that the calculation of the average cost may give a misleading picture, simply because the average always obscures extremes. For example, the average cost of nurses' salaries conceals the fact that salaries have a different value at different times of the day and on different days of the week, because of special payments made for unsocial hours. Thus, in any organization of nursing services where cost is deemed to be important, the different costing values of nursing time are important: this point is developed further in the section on the 'relevance' of economics to health care. Some types of cost used in economics are not in common use: examples are 'marginal cost' and 'opportunity cost'.

Marginal cost

Marginal cost is defined as the cost of providing an additional unit of whatever is being costed. It could be an additional hour of nursing time, an additional bed, an additional lecture course, an additional student. An additional unit may, of course, result in an increase of the total or the average cost. It is possible, however, for the total and, therefore, also the average cost to remain constant in spite of the additional unit and, in some cases, it may even be reduced. If the additional unit can be absorbed within the existing resources the cost

will remain constant. If the additional unit which can be absorbed within the existing resources brings revenue with it, the total cost will be reduced. An example would be a conference for which participants have to pay a fee. Any additional fee-paying person, who can be accommodated without any increase in resources, will reduce the total cost of the conference.

Opportunity cost

Opportunity cost refers to the value of alternatives which could have been chosen instead of the one item which has incurred the specific cost; it is the cost of a foregone opportunity. Thus, if one had the choice between appointing an additional member of staff or providing opportunities for the development of existing staff, the cost of the new staff member can be expressed in terms of sending existing staff to refresher courses or of giving them periods of sabbatical leave.

Decisions on resource allocation might be improved if, in addition to the calculation of total and average costs, the marginal cost and opportunity cost of a potential item of expenditure could be calculated.

Two further economic terms have a special relevance to the health service and, therefore, also to nursing. They are cost-benefit and cost-effectiveness. There tends to be confusion between them and they are often used interchangeably, which is an error. The distinction between the two concepts is, in fact, of more importance than is usually admitted.

Cost-benefit

Basically, cost-benefit analysis is a technique designed to express both the cost and the benefit of a specific good or service in monetary terms; the purpose of such a calculation is based on the premise that the expenditure should not be incurred unless the benefit outweighs the cost.

Cost-benefit analysis would be relevant in a situation of choice in the spending of a given sum of money. For example, would it be 'better' to build a new renal-dialysis or a long-stay unit? Should the College of Nursing use its financial allocation on equipment or on employing a librarian? Should the up-graded ward be provided with new seating facilities for ambulant patients or with a computer ward terminal to be used for a variety of purposes, such as nursing orders?

In each case there is choice between competing uses for the available finance. In theory, cost-benefit analysis seems a sensible

and objective way of allocating resources. In practice, it has many problems. The main difficulty is the calculation of benefits in monetary terms: clearly, many of the benefits are of a social, or human, rather than a financial value; the comfort of patients being provided with new seating is an example. The comparison between benefits of a renal-dialysis with a long-stay unit is, inevitably, related to social and political values, although some financial costs could be calculated. Thus, it would be possible to compare the cost of maintaining a person requiring long-term care in his own home with the cost of maintaining such a person in a purpose-designed unit. What is not easy to cost is the financial outlay of the person's family and any social costs incurred by keeping him at home or conversely, the financial and social costs to him and his family by removing him from his own home. These are intangible costs which by definition tend to be elusive. Another major problem in the practical application of cost-effectiveness calculations is that of 'discounting'. Discounting refers to the need to consider future costs and benefits of any capital expenditure, such as a new unit or a piece of equipment. Such discounting techniques are not only complex but also subject to many 'unknowns'. If a service is new, it is not possible to assess its likely future benefit or its likely future cost with any degree of accuracy. More fundamental than even the glaring complexities of the application of cost-benefit analysis is the ethical issue as to whether it is 'right' to base resource allocation on the formula that costs should be less than benefits.

For a review of cost-benefit studies the reader is referred to Culyer (1976). Porter (1979) draws attention to some problems of cost-benefit studies in health service resource allocation.

Cost-effectiveness

Cost-effectiveness refers to the comparison between different methods to achieve a given outcome. It is not a matter of choice between totally different projects such as dialysis or a long-stay unit, but between different designs for either, or between different staffing patterns for either unit. It is not a matter of choosing between equipment or a librarian for the College of Nursing, but between different makes of the same type of equipment or between employing a qualified librarian on a part-time basis or two unqualified librarians on a full-time basis. Cost-benefit analysis is simpler than cost-effectiveness but its scope is more limited. It has, of course, a totally different purpose. Although most people use a measure of cost-effectiveness thinking in deciding how to spend their money, precise calculations are not problem-free. The discounting

techniques referred to above, are also relevant to cost-effectiveness: deferred costs cannot be ignored and effectiveness in the long term may differ substantially from short-term effectiveness.

Efficiency

Efficiency is a well-used term in common parlance. In economics its main function is to compare and contrast it with effectiveness. A procedure may be effective but, if its benefit is small in relation to the resources used for it, it may not be efficient. While effectiveness is implicit in efficiency, the converse is not necessarily true; there may even be cost-effectiveness without efficiency, as input of resources may not merely be one of cost. Thus, it is possible for a routine procedure to be so much part of the daily routine that its possible benefits are no longer considered; they have been lost sight of; they may have been important in the past but are no longer relevant. Examples are deliberately omitted because they can so easily obscure the principle; readers may disagree with an example quoted and reject the point it was intended to make. It is hoped that the issue of 'efficiency' may find its way into the reader's decision-making and that reasons for, and benefits of, rules and routine activities can be made explicit. The specific relevance of the effectiveness/efficiency debate to health care was identified by Cochrane (1972).

Elasticity of demand

Elasticity of demand is a concept which denotes the degree of responsiveness of the quantity of a good demanded, to changes in its market price. It is a crucial concept as it relates demand, supply, cost and revenue to each other and it is their interrelationship which forms the basic structure of economic theory.

The elasticity of demand can have one of three values: it can be greater than unity, less than unity or equal to unity. It is greater than unity when a cut in price raises the demand so much that the total revenue (calculated as unit cost multiplied by number of units bought) is increased: conversely, a rise in price would reduce the demand, resulting in a decrease of total revenue. An example would be the demand for, say, package holidays. If their cost rises dramatically, less people would indulge in the luxury and the total revenue from package holidays would be reduced. For most people, a package holiday is a luxury item and the demand for it is adjustable—'elastic'.

Elasticity of demand has a value of unity, if a change in price, upward or downward, leaves total revenue unaffected: that is,

people will spend exactly the same amount for the item, but they will acquire less of it if the price has risen, and more if the price has fallen. Elasticity of demand is less than unity if the demand for a good changes very little in relation to the percentage change in price; that is, almost the same quantity is bought irrespective of the price; such demand is referred to as inelastic; it is not adjusted. The demand for a good tends to be elastic if it can either be dispensed with altogether or if it can easily be substituted by a cheaper good thought to have the same or a similar benefit. For example, a person may give up foreign holidays altogether, if the package becomes more expensive; alternatively he may choose a holiday such as camping as a substitute. A reduction in foreign package holiday prices may induce some people to have more or longer holidays; for them the demand would be elastic. A person committed to two weeks holiday per year may have an inelastic demand for the package holiday; he would accept any change in price without changing his holiday plans. Another person would respond to a price rise by shortening his holiday, and to a reduction in price by adding just a day or two – less than the percentage price reduction. The elasticity of demand concept is deliberately laboured a little because of its important relevance to the health service and, therefore, to nursing. Three extreme possibilities of demand elasticity are shown graphically in *Figure 15.2*. (There are several intermediate positions when demand is adjusted to price changes in less extreme ways).



Figure 15.2 Three extreme possibilities of demand elasticity. (a) zero elasticity: quantity demanded (D) does not change as price changes; (b) unit elasticity: quantity demanded changes by exactly the same percentage as does price; (c) infinite (complete) elasticity: quantity demanded at a given price is infinite, but becomes nil if the price rises even a little

The relevance of economics to health care and its contribution to the study of nursing

Nursing is inextricably bound up with a country's health care system and any considerations of health care have relevance to nursing, the

converse being equally true. A professionally responsible nurse must view her professional activity, in whatever field it may be, within the context of health care. Health care policy-makers, whether at local or national level, would ignore nursing at their peril. The discipline of economics can be a valuable ally to all, as it has the potential of giving a measure of informed objectivity to decision-making. Of course, it is possible to ignore economics and to continue, as the nursing profession has done for many decades, to rely on tradition and commonsense, which seem to have served the profession reasonably well. However, it is not possible to grow in professional maturity and stature while remaining oblivious of the changes surrounding and impinging on the health care system. One of these changes is the development of health economics as a prestigious discipline, the contribution of which to the health service can be expected to increase. There is little doubt that health economists will concern themselves increasingly with those issues in the health service which have economic implications and, based on those criteria, not many issues do *not* qualify for their concern. The purpose of this chapter is not to cause nurses to feel threatened and, therefore, to take a crash course in economics, but, rather to alert them to the benefits which can be derived from using economic expertise in the development of nursing science. In order to do that, it is necessary to acquire sufficient knowledge to ask relevant 'economic' questions and to be able to interpret 'economic' answers. The study of nursing would be enriched by bringing an economic perspective to it and by marshalling economic arguments in decision making.

The growth of health economics is demonstrated by the proliferation of specialized literature in the field, by growing number of health economic research units and by the increasing number of economists who are employed specifically to advise national and local policy makers. Normative, as well as positive, economics is being practised; in other words, economists recommend the actions to be taken by health professionals. Just as nurses would benefit from a functional partnership with economists, so economists would be helped in their recommendations if the professionals were willing and able to state their case, their objectives, their wishes and their apprehensions based on their professional judgement. Economists require pertinent questions if they are to give pertinent answers; the professional should pose the questions and the professional should assess the feasibility of the answers and recommendations.

Such a dialogue presupposes an appreciation of the scope and potential of economics. Some of the areas of relevance of economics

to health care have been mentioned already. Economics flourishes at a time when demand for resources exceeds their supply and when choices have to be made. It must, therefore, be immediately obvious that economics is on an upward path and that its application to health care will become more, rather than less, important. At the beginning of this chapter an attempt was made to explain what economics is, by identifying some questions with which it would be qualified to deal; the same can be done for the subspecialty of health economics.

Professional judgements are crucial

How can health care be measured? How can it be evaluated? How can the cost of health care be contained? On what basis should health care resources be allocated? How can health care be rationed? What effects would certain innovations, such as a new health centre, have? What is the cost of treatment, of prevention, of care? Health service administrators must find these questions as familiar as they are baffling. Economists will come to their aid by presenting them with a set of alternatives indicating their relative economic implications and predicting their economic consequences. However, economists are not able to assess the professional implications and they cannot be expected to predict professional consequences. The professional judgment is a crucial part of health service planning, and such a judgement will be more pertinent to the reality of constraints and more acceptable to hard-headed economists if it demonstrates an informed economic awareness. Cooper and Culyer (1973), Abel Smith (1976) and Culyer and Wright (1978) provide helpful examples of the relationship between economics and health care. Nurses, in their professional role, cannot opt out of economic considerations; they represent a major scarce resource (*Table 15.1*)

Table 15.1 Distribution of Health Manpower (whole-time equivalents) in the United Kingdom, per 10 000 population, in 1977. From Social Trends No. 10 (HMSO, 1979)

Region	Health manpower			
	General medical practitioners	Hospital doctors	General dental practitioners	Nurses and midwives
England	4.84	6.13	2.55	73.5
Wales	5.05	5.96	2.09	79.0
Scotland	5.98	9.19	2.33	102.2
N. Ireland	5.56	7.84	2.27	98.6
United Kingdom	4.98	6.45	2.50	77.1

by providing the most costly of all services for patients. Their service is costly because of its constancy over 7 days a week and 24 hours a day. It is a service which tends to be taken for granted and which is rarely assessed for effectiveness or efficiency.

Application to nursing

The final part of this chapter is concerned specifically with the application of some economic principles to nursing. It is contended that it is not merely the substantive economic theory which has relevance to nursing, but also the approach used by economists in the study of their subject matter. The distinction between macroeconomics and microeconomics is alluded to in the first part of the chapter. Nursing could benefit from developing an analogy: macronursing and micronursing.

If nursing wishes to convince doubters that it has its own body of knowledge, its own disciplines, albeit representing a constellation of various disciplines, nurses must develop macrothinking. They must learn to think in terms of populations as well as individuals. They must, in parallel with medical epidemiologists, develop a nursing epidemiology: they must develop the ability to think in terms of issues, trends and problems which extend far beyond the nursing care of individual patients. It is such thinking which will enable them to make reasoned predictions about nursing needs and resources. The work of Norton, McLaren and Exton-Smith (1975), and the thinking behind the pressure-sore census undertaken in Glasgow, Scotland by Clark *et al.* (1978), are sound beginnings of such an approach: the scope is vast, the possibilities are exciting and the endeavour to pursue them is urgent.

In no way is it suggested that 'micronursing' is less important, merely that the 'micro' approach is better known and far more often adopted. If nursing can be divided into nursing education, nursing administration and nursing practice – a common although perhaps not an ideal division—micronursing concerns itself with the education and training of current student groups and individual students; it concerns itself with the administration of current nursing services, whether at the level of a health area, a hospital ward or a health centre; it concerns itself with the delivery of nursing care to those individual patients currently in need of it. Economics can make an important contribution to those concerns. The variations within the overall concept of cost, explained above, can be applied with benefit to the nursing scene; the example, given there to illustrate the concept of *opportunity cost* is taken from nursing.

Nursing administrators, teachers and clinical nursing staff are

constantly confronted by choices; often, their decisions are based on intuitive judgment alone. A deliberate assessment and calculation of those opportunities which have been foregone by making a certain choice, may be revealing and may lead to more objectively defensible decisions. To take the use of the concept into the ward area, the ward sister may calculate the opportunity cost of, for example, insisting on routine temperature, pulse and respiration recordings for all patients.

Marginal cost rarely enters into nursing thinking; it need not be related to financial cost, only although its financial application is the most pertinent. Given that the money value of nurses' salaries is not evenly distributed over the 7-day week and the 24-hour day, it is important and relevant to calculate the relative costs of an additional unit of nursing time to determine its cost-effectiveness. Such a calculation may result in some modification of ward routine and, in assessing alternatives, economic as well as professional issues must be allowed to have their place.

Elasticity of demand is a concept which, at a time of economic pressures, has a crucial and sinister implication. Elasticity is related to alternatives and substitutes. If the price of a good or a service rises, and the demand for it is elastic, it will either not be bought at all or some attempt will be made to find substitute components which, while preserving the overall purpose, will make it cheaper to acquire. The service of providing personal direct nursing care for patients, unhappily often referred to as 'basic' care, can be used as a telling example. As the salaries of nursing personnel rise, nursing care becomes more expensive. It is a service which cannot be avoided altogether: it must be provided by one means or another and the cheapest possible provision will be explored. If such nursing care is costed merely in terms of pairs of hands required for it, the substitution of qualified nurses by nursing auxiliaries is an obvious and attractive answer. Is the demand for personal direct care of patients elastic with respect to pairs of hands, or elastic with respect to *qualified* pairs of hands? Are we able to substitute qualified for unqualified personnel, provided that the numbers are held constant, or are we 'inelastic' in our demand, being unwilling to adjust our demand for qualified nurses, whatever their price? Clearly, an emotional insistence on the latter will not satisfy non-professional holders of purse strings. Our case will need to be substantiated. An example of such reasoning was provided by Hockey (1972).

Cost-benefit and cost-effectiveness analyses are clearly relevant to nursing in all its fields. As indicated above, they require in the first place a clear statement of objectives, the ability to identify the essential elements to cost these and also the knowledge to make

statements on pertinent discount rates in order to make allowances for future costs and benefits. Such calculations require a coming-together of nursing and economic considerations. *Cost-effectiveness For Nursing* (Brown, 1978) represents a collection of relevant papers, which show the merging of the two disciplines of nursing and economics. Doherty and Hicks (1977) show the application of cost-effectiveness analysis to health care programming for the elderly.

Efficiency in nursing

What is *efficiency* in nursing? Few nurses would deny that they are aiming for efficiency and that they are able to identify efficiency or, more easily, inefficiency. How is efficiency described, analyzed and measured? Few nurses would deny that they lack the necessary expertise to answer such questions. Nurses in all fields and at all levels have a responsibility to achieve efficiency, and those who value their professional status, value this responsibility which is an integral part of it. The responsibility cannot be wholly delegated to other experts, such as economists, but rather, the discipline of economics should be exploited for the benefit of nursing, which requires an appreciation of its potential contribution to the study of nursing. It is not a matter of competition, but one of collaboration: without it, economists and nurses will go their own separate ways and both disciplines will be impoverished because of such separatism.

Nursing represents a unique mix of many disciplines, the uniqueness lying in their mix, both qualitatively and quantitatively. Economics is one such discipline. Qualitatively it belongs to all branches of nursing, although its relative emphasis within them may vary. If economic science were given its rightful place within the science of nursing, and if nurses at all levels and in all areas of nursing were willing to apply it to their respective spheres of activity, decision-making would be greatly enhanced. Efficiency, as a concept, could be transformed from being a subjective and ambiguous cliché to an objective, reliable and measurable entity, totally amenable to application to the art of nursing.

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The relationship of management to nursing practice

DOROTHY BLENKINSOP

'... Good management is ... an essential precondition of good nursing'. General Nursing Council for England and Wales (1974).

The application of the science of management to large industrial concerns is accepted by workers, unions and boards of management as an essential feature of the organization. Within trade union organizations, management science may not be an outstanding characteristic but its existence cannot be denied, for the evidence of delegation of authority from regional officers to local level is obvious, and the communication system from national to local level is generally the envy of employers.

The science of management covers a broad spectrum. If its relevance to any type of organization is not obvious there can be a temptation to produce evidence of it in order to highlight its existence. By bringing together a number of people to perform tasks, management skills are exercised – at least, control and coordination are used, possibly delegation also. If the number of staff requires greater supervision than can be given by one person, a structure, with agreement about levels of authority and responsibility, is necessary. This type of organization is so much part of everyday life that management science is seldom given credit for what may appear to be common sense.

Management defined

Definitions and descriptions of management abound, but two will suffice to indicate the scope of management in any enterprise:

1. 'Management is the search for the best use of resources in pursuit of objectives subject to change' (Keeling, 1972).
2. 'Management is essentially a human affair ... On the other hand, management is a job ...' (Falk, 1961).

As with many statements plucked out of context, definitions do little to explain what management is, so that it can be studied as a subject. Perhaps management, like nursing, is a unique mix of a number of

sciences. 'Management is not a distinct body of knowledge that can be learned like a discrete academic subject. Whilst drawing on a very wide range of theory for its concept and techniques, the real meaning of management is not learned until it is experienced by actually managing. And as the student experiences it the meaning deepens, so that meaning and experience are continuously feeding into each other' (Department of Health and Social Security (DHSS), 1974). To seek to apply a science which is not 'a distinct body of knowledge' to another discipline which is a unique mix of many sciences, is a task for a masochist or the intrepid investigator!

When discussing the application of a specific science it is necessary to produce evidence of the skills which are required in order to apply the science. Although the science 'management' may draw on a variety of theories, it has its own concepts, knowledge inputs, and an identifiable set of skills. If these skills and knowledge are drawn from elsewhere, it in no way denigrates management science. To disentangle concepts, theories, skills and knowledge is difficult and the student is often treading in a semantic jungle. The *Concise Oxford Dictionary* definition of skill is 'expertness, practised ability, facility in doing something'. A skill can be developed without the practitioner having an understanding of the knowledge on which that skill is based. An example from a nursing situation will indicate this. A nurse can be taught to carry out a surgical dressing, using an aseptic technique, and may become highly skilled in this task without any knowledge of the reason for doing the dressing nor of the principles of asepsis. Provided that each surgical dressing is identical, and the equipment used remains unchanged, the nurse will be competent to perform the task, but if either variable changes she will be unable to make the necessary decisions about essential changes in technique because the background knowledge is lacking.

Within the sphere of management the practitioner will be unable to improve her skill in effective verbal communication without knowledge of communication theory. To apply—and more specifically, to develop—a skill, background knowledge is essential. DHSS (1974) guidance on management training stressed the need for recognition of this point in the statement '... the skills ... must be firmly based on relevant knowledge ...'

The application of management theories and concepts within the nursing organization

Abstract theories and concepts can be discussed as an interesting academic exercise, but it is more exciting to discover their

application in known situations. This gives greater understanding of a situation, hitherto thought to be familiar, revealing new insights and dispelling the mystique that so often surrounds an unfamiliar science.

The case for management of the nursing service has often been made, by many, in various places, but its purpose and function is still not fully understood. To accept a nursing service which is lacking coordination, control or direction is unthinkable and, in reality, would be a recipe for disaster. To organize a large workforce to provide care on a continuous basis requires the application of managerial knowledge, through the use of management skills, based on sound management science.

The following examples show the application of management concepts within the nursing service. The interested student can read about many other managerial concepts and, by diligent observation, can identify their application within the nursing service.

The hierarchical pyramid

Following reorganization of the British National Health Service in 1974 (*Figure 16.1*) the organization of nursing services in the

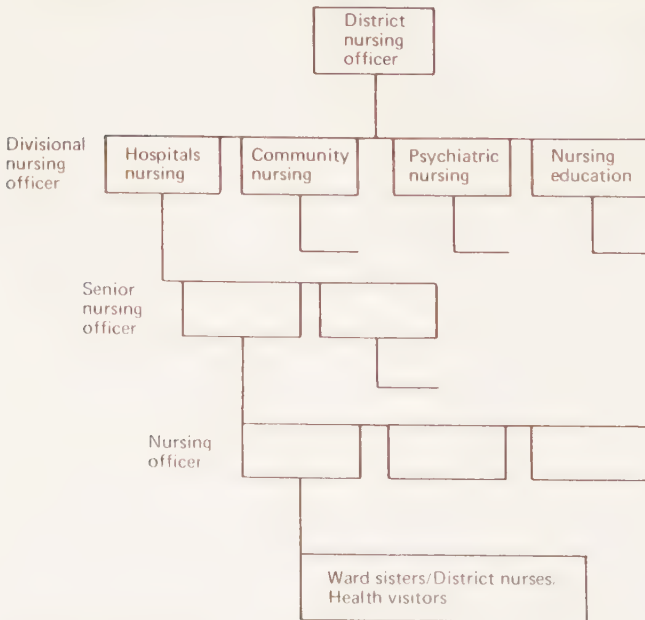


Figure 16.1 Nursing service organization for a health district following reorganization of the British National Health Service in 1974

integrated health services continued to be based upon the recommendations of the *Salmon* (Ministry of Health, Scottish Home and Health Department, 1966) and *Mayston* (Department of Health and Social Security, Scottish Home and Health Office, 1969) *Reports*, which relate to the hospital and community services respectively. The resulting hierarchical pyramidal structure is apparent throughout the UK. Essential features of this type of organization are delegation of authority and responsibility to subordinates, with the superior officer retaining control and coordinating these subordinates.

Every nursing organization should be unique and flexible in order that it can respond to the local situation, responding to the needs of the community for whom it exists, for the staff for whom it may provide training, and to achieve the agreed organizational goals.

Management within clinical nursing

Management science is part of the art of nursing and not a separate entity to be grafted on to the skills of the trained nurse when she achieves the label 'nurse manager'.

Every nurse is a manager. She has to manage, effectively and economically, resources of some kind, even if they are solely the contents of a dressing pack. She also has to manage her time. However, those senior nurses to whom the title 'manager' is given, obviously have a more extensive management role, embracing responsibility for greater resources, budgets, people, and so on. Nevertheless, the nursing perspective that they bring to their roles is vitally important when management decisions have to be made. A crucially important aspect of their role is to facilitate and enable the smooth running of the hospital and community nursing services, as well as doing their utmost to ensure that adequate resources are, as far as possible, reserved for safe nursing care delivery.

The unique function of the nurse as Professor Baroness McFarlane (1977) has pointed out, is to give nursing care. 'To this function both nursing management and nursing education are in the service relationship. Their actions can only be judged by the excellence of nursing care they enable.'

It was recognized by the General Nursing Council for England and Wales in 1974 that '... the first elements of management skills are learned and practised during nurse training ...' (Fawkes, 1974) and it may be that attempts to identify the specific skills are unnecessary. However the discerning student who recognises the unique mix of skills in nursing may wish to test her or his own professional development by an assessment of ability in this sphere.

Regrettably, the objectives set by the General Nursing Council in

their guidance document *Preparation for Management Within Training for Registration* are related to the organization of the nursing service and the managerial responsibilities of nurses, both as managers of nurses and as providers of nursing care. The objectives do not include reference to management within nursing care although this is contained within one of the underlying assumptions. 'Effective management is an essential part of the care of patients although its concern for the way nursing is organized and coordinated with that of other professions in the ward or department; the way nurses are led, motivated, trained and supervised; the way effective communications are achieved with patients, relations and other staff; the way the resources available to the nurse are used; and the way the nurse—trained or in training—understands her personal contribution to the aim of the National Health Service organization she belongs to. In this very basic, practical view of management it is inseparable from professional patient care and calls for learning and practice alongside and through the learning and practice of total patient care.'

The nursing process

Total patient care continues to be conceptualized rather than applied in many nursing service organizations within the National Health Service in the UK, but increasing emphasis on the nursing process and emphasis that the training of nurses should be linked to the nursing process will hasten its practical application. Analysis of the nursing process will demonstrate the need for a knowledge of management and the use of management skills. The steps of the 'model' of the nursing process can be compared with those in any management process.

A study of different writers on the management process (I emin, 1977) revealed 12 different management cycles and 19 different management functions within those cycles. They all contain the basic elements of decision making, planning, action and evaluating. In *Table 16.1* the steps of the nursing process are listed alongside similar steps in the management process. Just as every management situation is theoretically unique, each nursing situation is unique because each patient is different. Physical and psychological reaction to illness varies, as does the ability of those giving care to relate to individual patients. This, however, does not undermine either the nursing or the management process. The framework within which each step is carried out is essential in order to provide

Table 16.1 Steps in the nursing process and the management process

<i>Nursing process</i>	<i>Management process</i>
Observation of the patient in his total environment	Understanding the total background of the subject
Assessment of need	Identifying and analyzing the problem; decision-making
Making a plan of care	Planning policy
Giving care	Executing policy (control and coordination)
Evaluating the effectiveness/suitability of care	Evaluating policy

objectivity and rationalization of the task. *Table 16.1* indicates how the steps of the nursing process can be related to those of the management process.

For those involved in managing the nursing service, the steps can be reduced to three (Nelson and Blenkinsop, 1976):

1. Sensing the expectations of other professional disciplines who have an interest in the nursing service
2. Planning nursing services to satisfy in some measure the expectations of other interested parties
3. Directing the use of measures to produce services planned.

These stages of the management process are equivalent to the three classes of management decision mentioned in the *Salmon Report*: policy, programming and executing decisions. Thus, the nursing process follows closely the management process, requiring analytical skills, problem solving and decision making as well as communication skills. The information required for the process, apart from clinical knowledge, is knowledge of organizational structure, multidisciplinary team work, coordination, planning and delegation.

If the nursing process is considered step by step, it becomes easier to identify the managerial skills and knowledge required in each step.

Observation of the patient in his total environment

Observation can be a passive word or can connote understanding. Within the nursing process, observation of itself is of little value unless it aids understanding and leads to action. This progressive act can occur only if the observer has knowledge—detailed knowledge

of the 'total environment'. While this cannot be classed as management knowledge, the skills required to aid understanding are the management skills of communication. If the patient is unconscious, the necessary information can be elicited only by questioning relatives: in most instances they will be only too willing to assist whereas an ill patient cannot be wearied by extensive questioning. The ability to relate to other individuals requires interpersonal skills, but the level of skill required is greater when a greater variety of people are involved. Within nursing, interpersonal relationships are further complicated by the unnatural situation of the participants. The patient may be reluctant, or unable, to develop a relationship. The nurse *must* develop a relationship, but the type of relationship will be dependent upon her knowledge and insight of the patient. 'Through discussions with the patient about their living habits, the learner will improve her skills in oral communication . . .' (Webb, 1979).

Crow (1979) has stated that one of the objectives of writing case studies based on the nursing process is '... to develop interviewing skills . . .' Interviewing skills, as with so many other management skills, are a mix of other skills, such as communication skills and skills of interpersonal relationships. They cannot be separated and one cannot be effective without the other.

Assessment of need

The assessment of a patient's need may, superficially, give the impression of being entirely a clinical problem; however, the steps required to uncover needs, require both analytical and problem-solving skills. First, it is necessary to differentiate between what the patient 'wants' and what the patient's 'needs' are. The two may not be the same. A very simple example is the 'want' of a patient to attend to his own toilet requirements and his 'need' to have complete bedrest. Wherever possible, the 'wants' of the patient will be included in the assessment of need but, when the two conflict, 'needs' will be paramount.

The second step of the nursing process depends in part on the input of information received from the first step. It may seem obvious that need cannot be assessed unless the necessary information is available but, all too often, managers attempt to resolve problems which have not been clearly defined. Information requires interpretation and cross-referencing, a study which will quickly reveal the need for more detailed examination of the information, or for additional information. When these data are available, the problem can then be identified and analyzed. Analysis

is the systematic examination of various elements and, again, will reveal the need for more information. Thus, throughout this stage of the process, the nurse will be continually reviewing and refining the information received.

Analysis of the problem, in itself, will not produce the first assessment of need. To reach that stage, the nurse must be aware of her legal and professional responsibilities to the patient. This will take into account those responsibilities which are firmly nursing duties, and those that fall to staff of other disciplines. While assessing the patient's needs in terms of total patient care, the responsibilities of the other professions will be noted; their assistance in assessing the total needs of the patient is essential. Among other responsibilities, the nurse is a coordinator, facilitator and enabler: her responsibility to the patient therefore includes giving the opportunity to colleagues of other disciplines to achieve their responsibility.

Patient care is not the sole prerogative of nurses but is the result of teamwork, with the nurse as an integral part of the team. Knowledge of other disciplines, their training, skills, knowledge and responsibility, is essential to the nurse so that she knows where to look for help and advice and how to use the expertise of colleagues. This expertise will be used by the nurse in making an assessment of the patient's need, which the nurse alone may not have the knowledge to do.

Making a plan of care

'Unless a decision has degenerated into work it is not a decision' (Drucker, 1970): the assessment of need should therefore lead to the making of a care plan. In this task the nurse is not entirely a free agent. Whether a nurse is in training or qualified, she must work within the constraints of the organization. The constraints may be minimal but should be understood. Each nursing organization should have promulgated agreements about responsibilities which nurses can accept, and the pattern of care may have been agreed. This agreement should have been reached through discussion with those participating in care, and may be organization wide, confined to a specific unit, or to one ward. Background knowledge of such constraints is essential but, whatever organizational systems exist, the nurse has a legal and professional responsibility which must be interpreted for each patient for whom responsibility is given.

Of equal importance is knowledge of financial management, in order that the financial constraints imposed on non-material resources is understood and that the plan of care will be based on

reality rather than idealism. Constraints can be irritating, but must be recognized as an inevitable feature in a public service.

Skill in analyzing problems and decision-making used in assessing needs will also be used in making a plan of care. Problems of planning care to meet needs will necessitate decisions, in order of priority, that take into account the availability of staff and of material resources. No patient is treated in isolation and therefore consideration of other patients' needs and the nurses' other responsibilities will be taken into account.

Giving care

The psychological and physiological state of any patient can change rapidly and any plan of care must be capable of adaptation; it must contain flexibility in terms of time, scale, and content. Ability to cope with change and with the unpredictable is as essential in a manager—whose role has been described as adaptive (Mott, 1972)—as it is in a nurse.

The phrase 'giving care' may create the wrong impression, for it would be difficult to 'give' care to a patient who refused to receive it. The patient is not a passive recipient in the process but an active participant. Counselling skills assume greater importance as care proceeds, and the nurse must give reassurance as well as reasons for the care programme.

Rehabilitation should begin, for the patient, with the first treatment and continue throughout the total span of active health care, by assisting the patient to adapt to changes which the illness may have brought about and which may affect future lifestyle. Training in the continuing care which may be necessary for the patient will require the nurse to have skills in this field and also health education skills. Health education is an essential feature of all nursing care.

Leadership is an essential skill for the nurse who is responsible for the care of a specific patient. She will act as coordinator of the care which may be given by practitioners of other disciplines. Knowledge of their work will enable the work of coordination to be carried out smoothly. Within the skill of leadership is included motivation and initiative, which will greatly assist teamwork. Throughout the step of giving care, a review of the care plan and its applicability to the changing scene will be carried out, with perhaps a consequent change of care.

Evaluating effectiveness/suitability of care

All planning must be evaluated—how else can one be sure that the

plan was the right one for the specific situation? Care may be correct for the medical condition but not for every patient with that specified condition. Evaluation is not simply an evaluation of the treatment given, but of the effectiveness of the treatment. Has the treatment given achieved the results anticipated? Care may have been given following agreed procedures, but if not given at the correct time it may be quite ineffective. Effectiveness will be evaluated by using agreed criteria to make judgements. This may be related to the stage of self-care which the patient has achieved or the stage of treatment in relation to the length of the disease process. Evaluation should also include the *patient's* assessment of the effectiveness of care.

While the purpose of evaluation is to measure the effectiveness of care of one patient, it is also of value to other patients by establishing norms against which different patterns of care can be tested. Because so much of patient care is dependent upon teamwork, the nurse will involve other disciplines in the evaluation process, using their judgements to assist in assessing her own objectivity.

Management skills and knowledge used in practical nursing

The management skills which will be used in the nursing process are shown in *Figure 16.2*, which indicate their use in each step of the process. A twelfth skill (public speaking) was included in an original similar list which was used to assess training needs and effectiveness of training (Blenkinsop, 1978). The list was a compilation of duties and responsibilities contained in nurse managers' job descriptions in the *Salmon Report* and 'key tasks' identified by Jones and Huczynski (1974) in the jobs of senior nursing staff and similar list from other sources. The lists of skills and knowledge were cross-referenced to ensure that, in order to use skills, knowledge was required.

Responses from 35 hospital-based staff nurses ranked the skills considered most important in their jobs to be 'developed good working relationships' (i.e. interpersonal relationships in the defined sphere of work), 'report-writing' and 'decision-making'. It was these same three skills in which staff nurses indicated that there was the least need for training (out of the given list of skills). This may be a reflection of the opportunity which they had throughout basic training to develop the skills which they use daily in contact with patients.

Management skills					
Report-writing					
Verbal communication					
Interviewing					
Training techniques					
Counselling					
Decision-making					
Analyzing problems					
Interpersonal relationships					
Leadership					
Utilizing staff and their skills					
Utilizing material resources					
	Observation of the patient in his total environment	Assessment of need	Making a plan of care	Giving care	Evaluating the effectiveness/suitability of care
Steps in the nursing process					

Figure 16.2 The application of management skills in the nursing process

Figure 16.3 shows the management knowledge which is used in the nursing process. Responses from 35 staff nurses showed that, from a list of 12 items of knowledge, all in Figure 16.3, (except 'financial management') were among the top four in a ranked list of importance. In contrast to their knowledge of management skills, staff nurses indicated the need for help in items of importance. Of 35 responding, 57.1 per cent required further knowledge of 'legal and professional responsibilities of the nurse'; 45.7 per cent needed instruction in 'organization and relationship within your employing authority'; 42.9 per cent wanted to know more about 'communication theory' and 40 per cent about 'financial management' in the NHS. These were four of the five highest percentage responses. It seems that, although skills are taught, learned, and acquired during basic nurse training, the knowledge which is necessary in order to apply those skills is neglected. Training

Management knowledge					
Communications theory					
Legal and professional responsibilities of the nurse					
Financial management					
Organizational structure within the employing authority					
	Observation of the patient in his total environment	Assessment of need	Making a plan of care	Giving care	Evaluating the effectiveness/suitability of care
	Steps in the nursing process				

Figure 16.3 The application of knowledge of management in the nursing process

which is orientated towards action tends to place greater emphasis on practical skills than on knowledge, but the two cannot be separated (Figure 16.3) and neglect of one negates much of the value of the other.

Neglect of management science within practical nursing will be to the detriment of the 'science' of nursing, the nurse and the patient. Management is a fundamental part of nursing care.

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Nursing Science in Nursing Practice

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This new book is the result of the collaborative efforts of a group of nurses who are widely known for their major contributions to the profession of nursing as clinical nurses, nurse teachers, managers and researchers. Collectively they examine the concepts, theories, models and perspectives of the various biological, behavioural, social and other sciences fundamental to nursing practice thus enabling the reader to apply a conceptual framework to her daily responsibilities.

The book makes a unique contribution to nursing knowledge, fosters critical thinking and a problem-solving approach to nursing in the belief that good nursing education will help to produce efficient nursing practitioners and effective professional nurses. It is expected that it will be a standard text for all undergraduate and postbasic nursing students and that it will become a valued source of reference for all qualified nurses, midwives and health visitors working in nursing practice areas, education, management and research.

Contents

Introduction: The Science and Art of Nursing • The Purpose of Education in Nursing • The Nursing Process • Scientific Nursing Research: Art and Science • Nursing Science: An Unfolding Sequence • The Influence of Social Policies on Nursing • The Physical Sciences in Nursing • The Science of Microbiology and the Art of Nursing • The Contribution of the Biological Sciences to the Art of Nursing • Nutritional Science Applied to Nursing • Philosophical Perspectives • Two Aspects of Psychology and The Application to Nursing • Educational Studies and Nursing • A Sociological Perspective • Nursing and Economics • The Relationship of Management to Nursing Practice

